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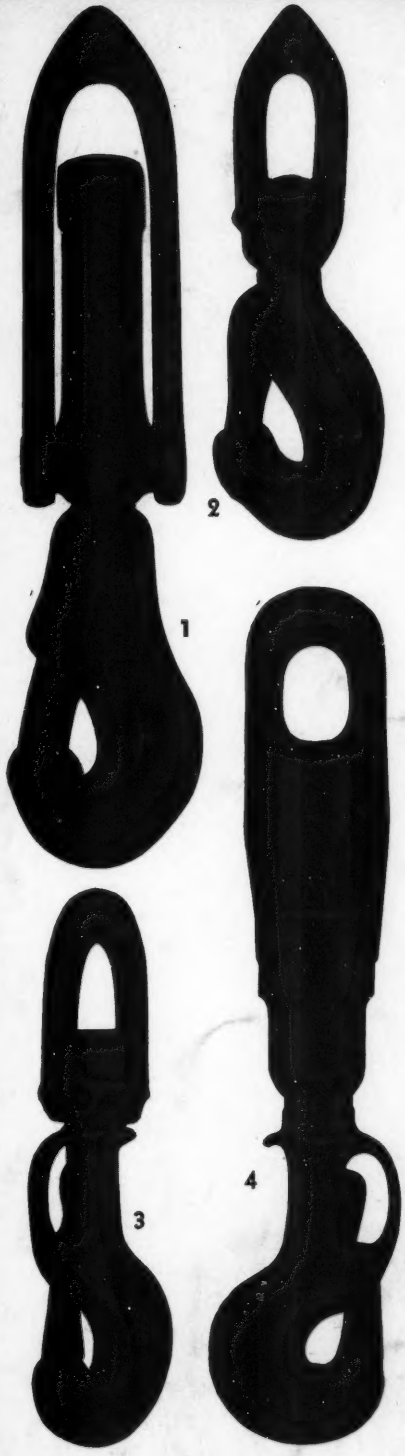
THESE PRODUCTION TOOLS ARE MADE TO FIT YOUR Needs



THE DEMANDS of modern production crews are for tools that are handy to use —that operate positively and safely—that stay on the job in good condition without constant replacements and repairs.

Here are tools that meet all these requirements because they have been designed for specific services, and for varying loads, by the largest manufacturers of a complete line of production tools. Whether your wells are shallow or deep, there is a BJ HOOK and a BJ ELEVATOR to FIT YOUR NEEDS—to help hold down costs and hold up profits!

1 All BJ Tubing Hooks are made for the one and only purpose of handling tubing. They are as light in weight as their load-carrying capacity will permit, and are easy to operate. The "50" (illustrated) is recommended for 50-ton loads; the "75" safely handles 75 tons of tubing.

2 For use in short derricks, where overhead room is at a premium, the BJ "30" Tubing Hook is extremely popular. All BJ Tubing Hooks are equipped with the exclusive BJ Locking Arm, which closes when the load is taken, forms a C-link for added safety, and can be opened only by the operator.

3 BJ Rod Hooks also have the "locking arm" which holds the elevator bail safely seated and strengthens the hook. The "15" is for 15-ton loads—there is a smaller size for carrying 10 tons of rods.

4 The [illegible] rod hook with [illegible] enclosed relief spring [illegible] readily accepted by [illegible] crews having extra [illegible] strings of rods to handle. There is less danger of cutting threads, and operations are safely speeded up.

5 The BJ "Full Circle" Elevator completely encircles the rod, which is always held vertically suspended as the body of the elevators wears downward in a uniform taper around the circumference of the bore. Costs more than other rod elevators — and is worth more.

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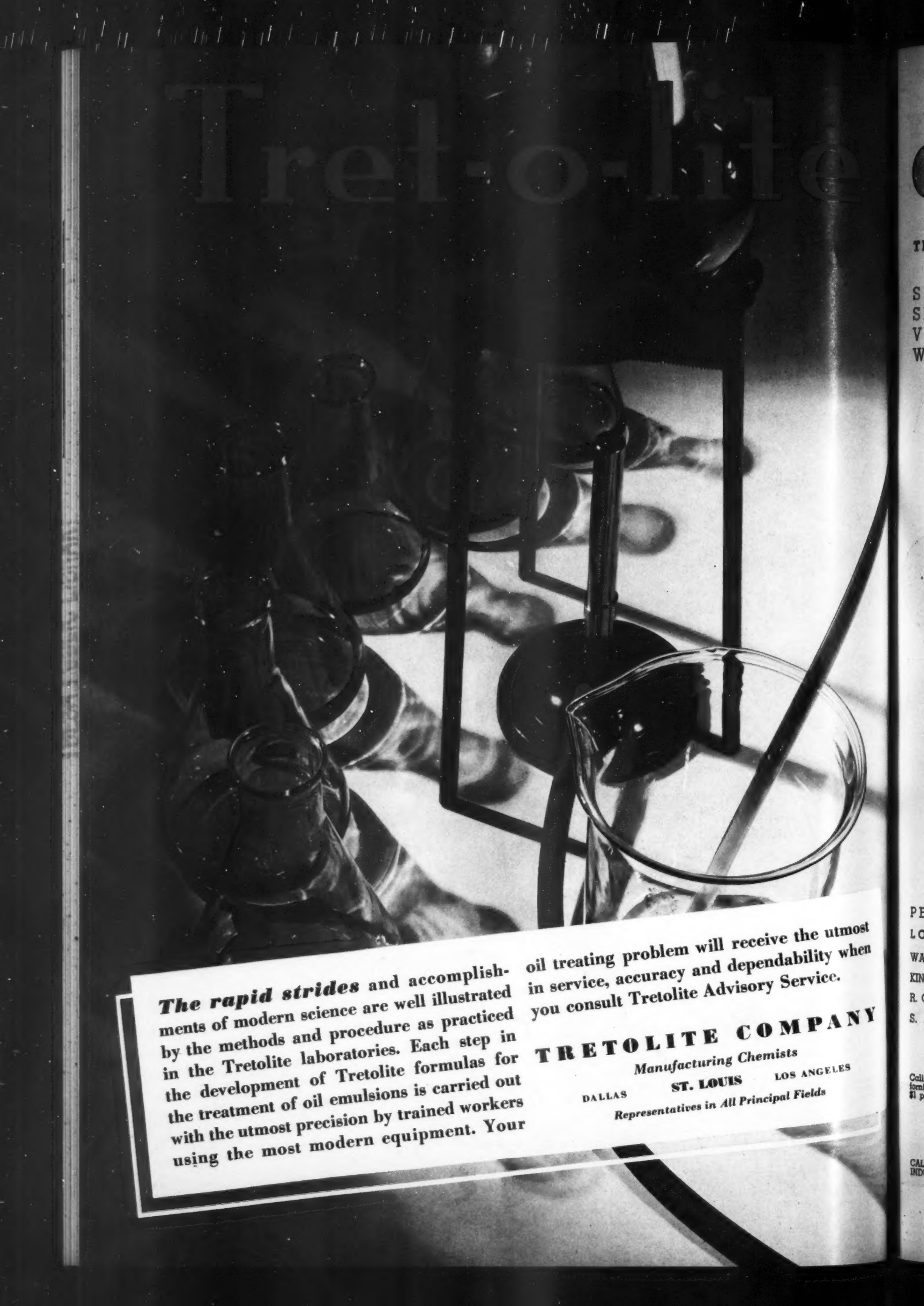

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OIL WORLD
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THE AUTHORITY ON THE CALIFORNIA OIL INDUSTRY

SECOND ISSUE
SEPTEMBER 1939
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WHOLE NO. 1545

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September 25, 1939

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WHAT THESE USERS SAY OF THE FIRST 50 MOBILHOISTS

The first fifty Mobilhoists sold in the first year of production have given an excellent account of themselves. These fifty Mobilhoists are scattered from India to Venezuela and from Argentina to Scotland, with many in the various Mid-Continent Fields.

More than twenty of these Mobilhoists were repeat orders. One company which purchased two Mobilhoists in 1938 has included four more in its 1939 budget.

Owners report that Mobilhoists have been very satisfactory in doing their various oil field jobs because they are designed to fit oil field needs. The Carper Drilling Company of Artesia, New Mexico, says, "We consider our 'Cardwell' Mobilhoist the best engineered unit of its kind that we have ever seen." (They own two other makes.)

"Cardwell" Mobilhoist is designed for explorative drilling and general well servicing. Available as single or double drum models with or without rotary or cable tool drilling attachments or mast. Available with Ford, Waukesha, Buda or "Caterpillar" engines.

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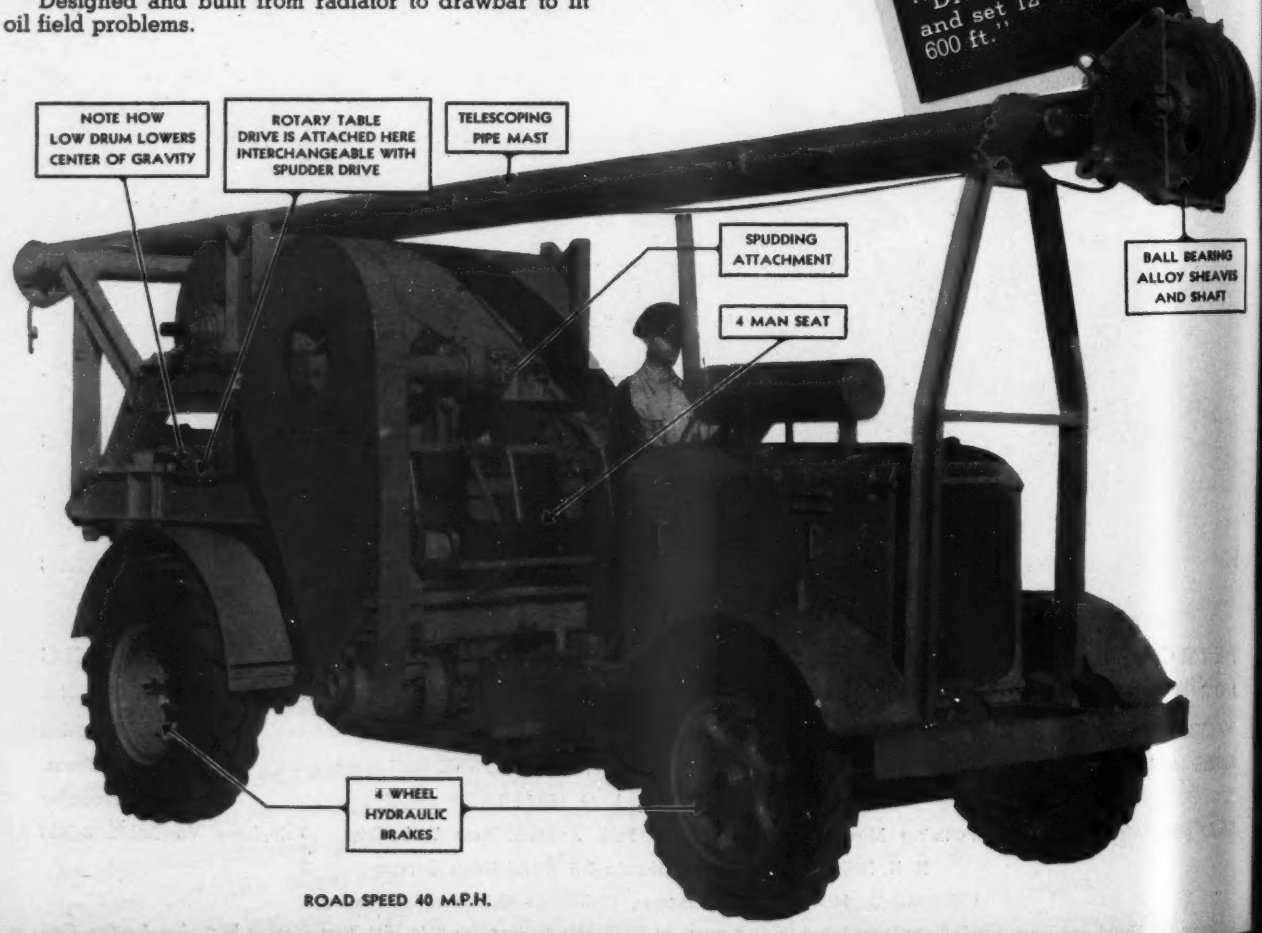
"Exploratory drilling to 2100 ft. with 2⅝" drill pipe."

"Set 7" casing with 4½" drill pipe to 1500 ft."

"Drilling-in with cable tools behind rotary rig to 3100 feet."

"Service 4000 ft. wells equipped with 3" upset tubing."

"Drill water wells and set 12" casing to 600 ft."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Wildcatters In Important Discoveries

General Petroleum's heavy equipment on Sullivan No. 1 is handled easily.

September witnessed continued important successes for California's wildcatters. There were apparent failures in the month's record, too. Richfield Oil Corp. indefinitely suspended work on K.C.L. No. 1, deep test of Wheeler Ridge. This was a small producer in a 8567 to 8765-ft. formation and was deepened to 11,-168 ft. to test the Oligocene, a record depth for a butane engine powered rig.

In the Strand Area, Continental Oil Co. was drilling ahead in shale at 13,405 ft. after coring a streak of barren gray sand at 13,260 ft. Bandini Petroleum's Northeast Coalinga extension, sec. 18,1-16, is producing 241 bbls. daily of 55.4° gravity oil through a 23/64 bean. Standard's No. 73-19B was last reported at 8270 ft. in oil sand.

In the Buena Vista Lake Area, Paloma Field (see maps on pages 24-25), considerable activity is promised as the result of Western Gulf Oil Co.'s discovery.

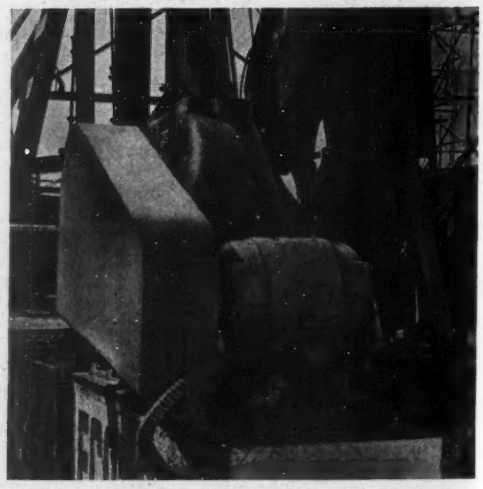
Western Gulf Oil Co.'s KCL-Panhandle No. 1, discoverer of Stevens zone production in sec. 3,32-26, has been redesignated as KCL No. A-54-3 of the Paloma Field. Drilled jointly by Western Gulf and The Texas Co., the well was completed flowing a 2246 bbl. rate of 50 plus gravity oil and 15,-

Here's the compact power and drilling fluid arrangement on Standard's No. 20-4, Coles Levee.

ELECTRICITY AT WORK IN THE OIL FIELDS

The high salvage value of electric motors is another of the many reasons why they are the choice of cost-minded operators. After delivering six, eight, ten and even more years of dependable service, an electric motor is still able to give good performance on the job and will command a comparatively good sale price.

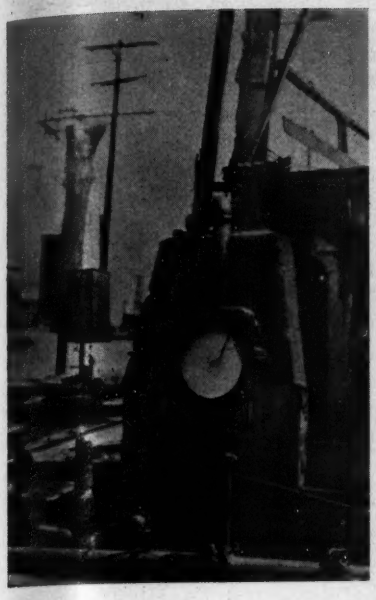
Compared cost by cost and expense by expense with other prime movers, electric motors win by a wide margin. They cost less to buy, less to operate, and are considerably more convenient and satisfactory. Ask an Edison power engineer about the profitable uses of electric power in the oil fields. Call the Edison office in your neighborhood.



This 20 horsepower U. S. motor with Emsco-Falk Reduction Gear, located at Huntington Beach, has been in service since 1933.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

9-39



Measuring Gas Flow on West Montebello producers.

000,000 cu. ft. of gas. The Stevens zone is open in a 165 ft. interval to bottom at 10,178 ft.

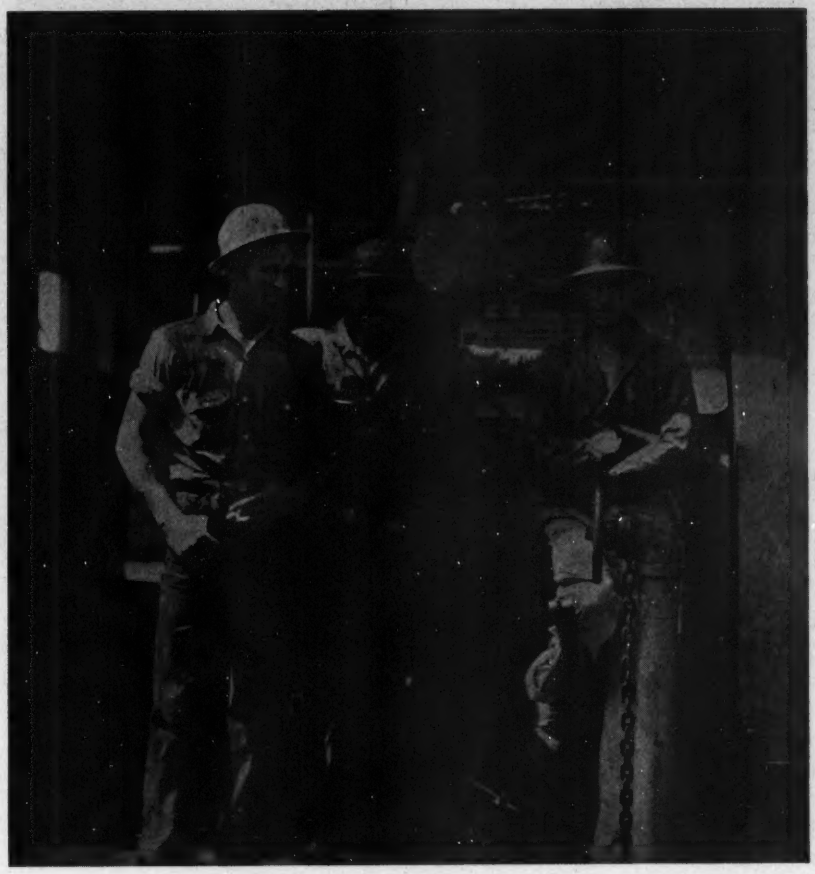
While many of the majors and some of the larger independent oil producing companys' hold acreage near the strike, direct offset acreage is held by the Ohio Oil Co. Holdings of all operators can be seen on the map of the field printed on pages 24-25 in this issue.

Richfield Oil Corp.'s BVA No. 81-36, located at the northerly tip of the Buena Vista Lake Gas Field in sec. 36,31-25, was spudded Sept. 1. The well, which is a test of the easterly edge of the lake bed, was last reported drilling below 5200 ft.

At the southerly limits of the lake bed, Shell Oil Co. is drilling BVA No. 45-9. The test, which required extensive grading to provide suitable location on sec. 9,32-25, was last reported at 3279 ft.

General Petroleum Corp.'s BVA No. 1, located in sec. 1,32-24 between the lake shore and the edge of the Buena Vista Hills Field, is drilling below 8895 ft. Nothing of commercial or geologic importance has been reported from the well.

Climaxing a long period of preparation, Union Oil has spudded Bowerbank No. 4-23 in the Buttonwillow area. Located in sec. 23,29-



They helped bring in Superior's Burner No. 1. Left to right, H. E. Crawford, F. A. Blau and J. W. Johnson.

Drilling Standard's No. 20-4 are these Rocky Mountain Drilling Co. men: Kelly Horner, Freddie Jones, Axel Livingston, Troy Polvadore and Howard Bowersox.

On General Petroleum's Sullivan No. 1, left to right, S. D. Watterman, L. Manus, H. M. Ballweber and A. B. Cunningham.

24, the try is 4 miles southeast of the recently abandoned California Exploration Co.'s 12,989 ft. dry hole.

Streaks of oil sand were found in the deep test, which, if less tightly packed, would probably have yielded commercial production. The Union test is drilling below 5000 ft. in the hope of finding comparable sands at shallow depths.

Superior Oil Co.'s Burner No. 1, super-rigged driller at the north flank of the rich Rio Bravo Oil field, has been completed, flowing a 3200 bbls. rate of clean oil through a 24/64 in. bean with 4,476,000 cu. ft. of gas. Located near the south quarter corner of the southwest quarter of sec. 27,28-25, the placing of the top of the producing horizon, or Rio Bravo Sands at 11,167 ft. identifies this hole as the highest point yet discovered on the structure. With bottom of the hole in oil sand at 11,415 ft., the thickness of the oil sands taken exceeds that of any other well.

The project was drilled by Superior's super outfit, which not only is larger and heavier than any other rotary equipment used to date, but has also had more publicity than any outfit used in the valley. The drilling record of the hole appears to justify the faith placed in it by the operators.

Spudded the last day of July, the well was completed at 11:00 p.m. on the 46th elapsed day after making 11,416 ft. of hole. Speed with which pipe can be run is best shown by the fact that the 7⅝ in. casing was landed at 11,166 ft. in 6 hours and 45 minutes. **Only twenty-eight minutes were required to put 2000 sacks of cement behind the pipe.**

One location to the northwest Superior is preparing to drill Weber No. 1 and one location to the east the company has poured foundation for Fink No. 2.

As long as the current Rio Bravo play continues to the North and West, Superior and Union Oil Companies will be busy, for between them they control all available semi-proved acreage.

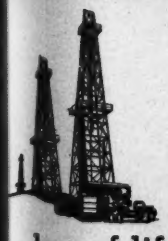
Union is, at the moment, attempting to free stuck drill pipe in it's active driller, Kernco No. 41-34. Located as an offset to the Burner well the try had made more than 8700 ft. of hole before trouble set in.

In the Basin Vulcan Oil Co. abandoned its Del Rey No. 1, sec. 22,2-15, at 7401 ft. in coarse gray sand. F. W. Kelso is fishing drill pipe at 2380 ft. in his Puente Area test, sec. 13,2-10.

Stepping up its rate of development in the Aliso Canyon field, Tide Water Associated Oil Co. is drilling two wells and grading location for a third. The company's first well on the Fernando lease, No. 11, is drilling below 2700 ft. while Porter

Drilling Standard's No. 20-3, Coles Levee, are these Taft Drilling Co. men: Driller Bob Morris, R. C. Teague, Herb Thoene and Bert Wathender.

WATER EXCLUSION IS *Vital!*



Water does great damage in a submarine, or oil well. In the former, it may mean loss of life and complete destruction of the underseas craft. In the latter, it usually results in great expense and many drilling difficulties.

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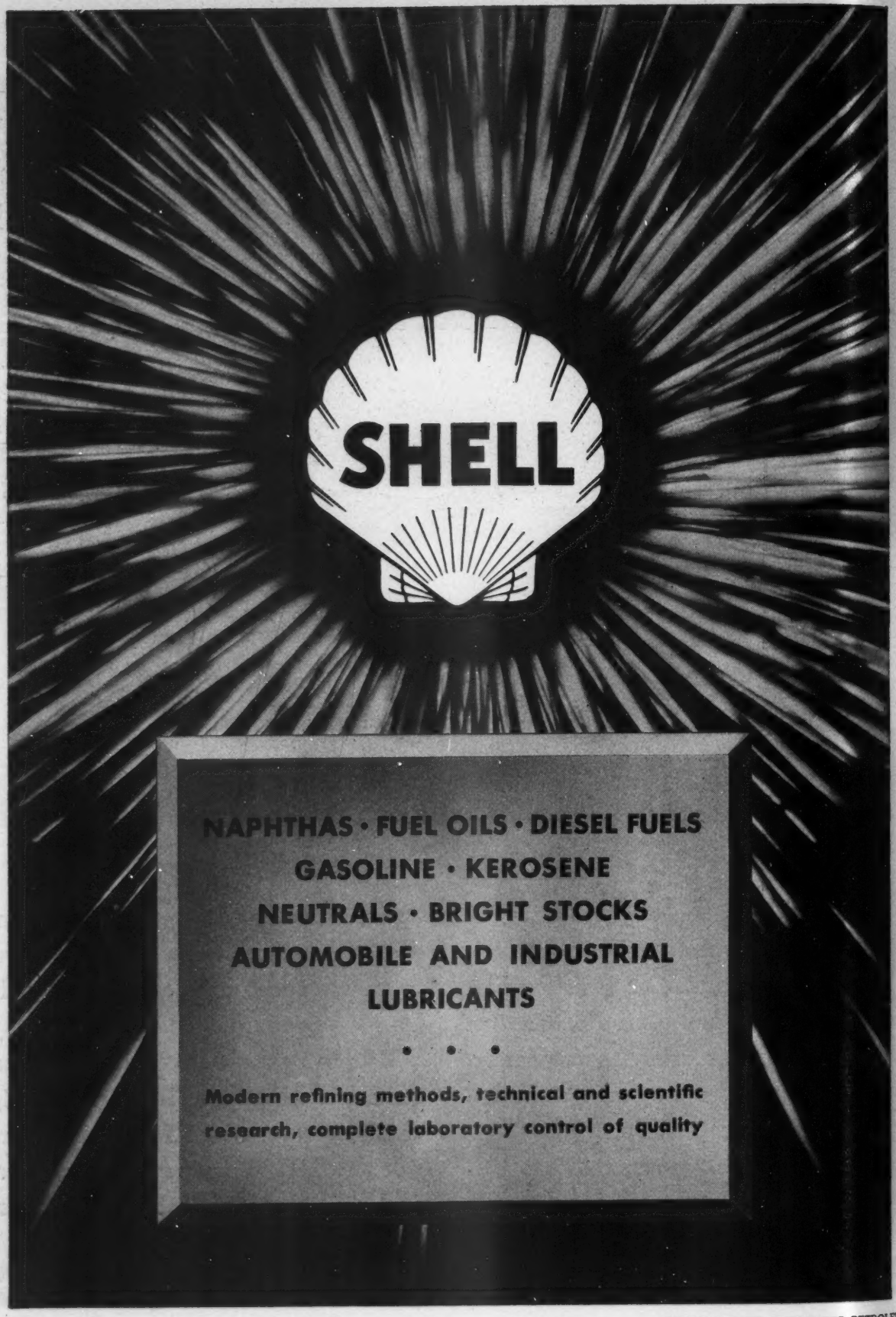
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Drilling Union Oil Co.'s Kernco 41-34, are C. A. Henry, Tommy Moss, B. E. Messick and L. C. Slayton. The bit stuck.

No. 12, fourth for the property is at 1500 ft. Rig site and roads are being graded for Porter No. 13. Here-to-fore Associated has drilled only one well at a time.

As official publication for the California Natural Gasoline Association, the California Oil World publishes in this issue two valuable papers presented at the association's September meeting.

AIME Annual Meet In Los Angeles Oct. 19-20

With the new World War play-

W. H. Geis

ing a prominent part in so far as the petroleum business is concerned,

While his soundness on light values in Bali might be questioned a trifle, Roy Hitchcock, the "H" in H and B Sales, qualifies as a top notch color cinematographer, as the above gathering will attest. Roy's kodachrome film taken on his recent jaunt through out-of-the-way places of the Near East and South America, were shown at a dinner he gave to oil men at Long Beach.

Drilling Standard's No. 12-5 are Lew Dickinson, Roger Forsberg, Larry Frey, Ross Abel and Charles Borden.

an active interest is expected to be taken in the annual meeting of the American Institute of Mining and Metallurgical Engineers Petroleum Division scheduled for Oct. 19 and 20 at the Biltmore Hotel.

Among the papers to be delivered during the two-day session and one which will get a lot of attention is the one by Admiral H. A. Stuart, U.S.N., Director Naval Petroleum Reserves. His paper will be "General Views of the Navy on Conservation of Oil in California." This has been a timely topic for some months, in fact it played a leading part in the efforts of those sponsoring the Atkinson oil control bill before the last Legislature.

So intense is the interest in oil and the fact that the subjects prepared will cover a wide field, many visitors from other states and nations have indicated their intention of attending the session this year.

(Continued on Page 39)

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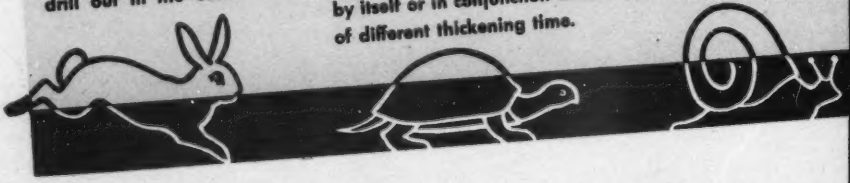

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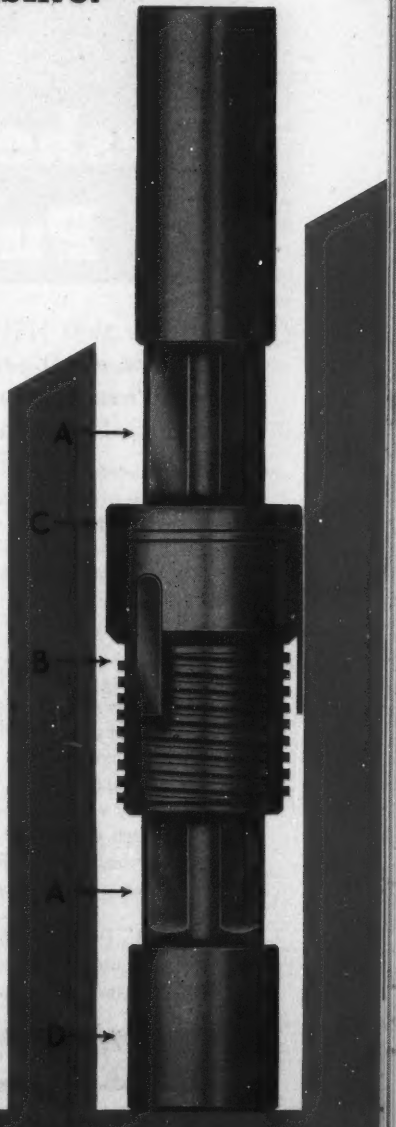
2—The safety releasing nut swivel bearing "B" rotates against a ball bearing thrust collar which is held by a jam nut—See part "C."

3—The lower end of the Setting Tool is threaded for 2½" upset, 10 thread tubing, so that you can either wash your liner or cement through the Setting Tool in one operation—part "D."

THE HANGER BODY IS A SINGLE PIECE, STREAMLINED BY THE ELIMINATION OF DRAG SPRINGS, SLIPS AND PINS.



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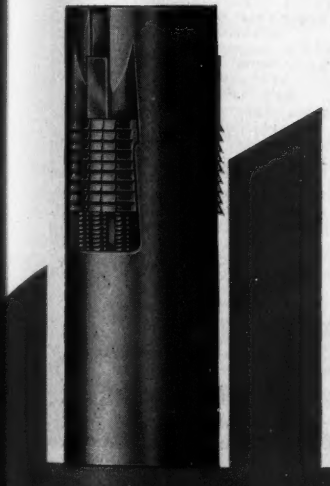
2—The telescopic Kelly acts as a bumper sub when formation bridges are encountered, and assists in getting the liner to the proper setting depth.

3—With the telescopic Kelly—it is possible to "jar up" if it is necessary to come out of the hole with the liner, especially when the liner has been run into a tight hole, such as a window in the pipe, etc.



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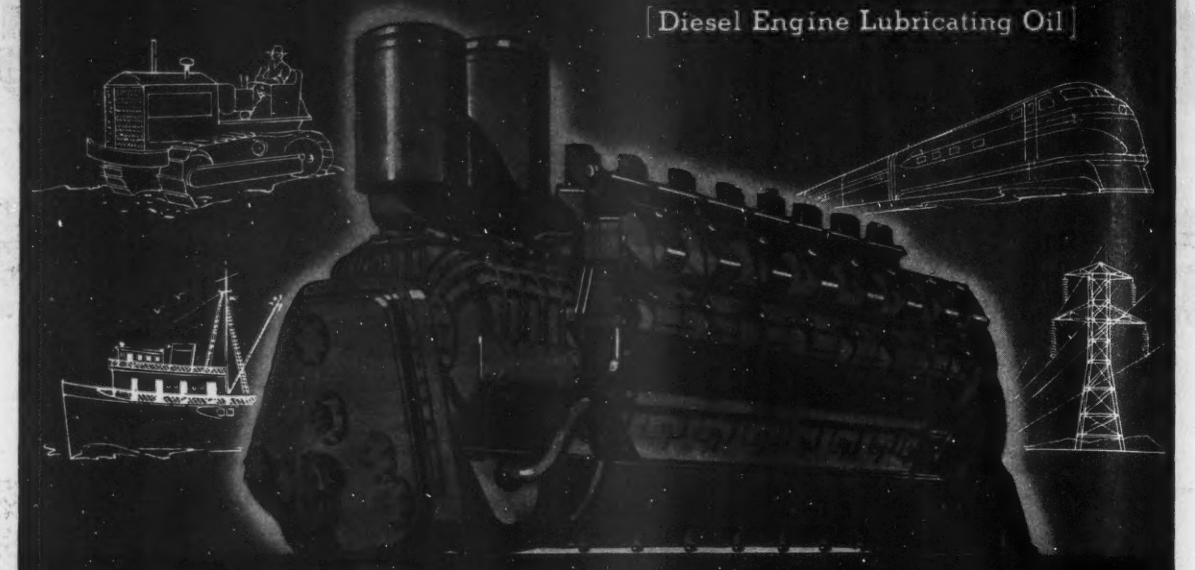

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Not only has NEW "RPM" DELO pushed wear rate way down—it also has reduced fuel consumption and exhaust temperatures materially. Better engine operation! Lower costs!

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Mines Bureau Gas Hydrates Study Resume[a]

Combating "freezing up" in Pipe Lines

By W. M. Deaton[b] and
E. M. Frost, Jr.[c]

Gas hydrates and their relation to the operation of natural gas pipe lines are subjects that have been receiving attention from the natural-gas industry for some time. Very little was known about natural-gas hydrates until Hammerschmidt[1],[d] in an article in 1934 reported upon his investigation of icelike compounds that were formed by natural gas in contact with water at high pressure. It was found that these compounds would form at temperatures considerably above the normal ice point, 32° F.. Natural-gas pipeline operators commonly were troubled with the formation of "ice" in their pipe lines, and when it was pointed out through Hammerschmidt's work that the "freezes" were due to gas hydrates instead of water ice, as had been supposed, the natural-gas industry became greatly interested. The subject seemed of such importance to the industry that the Natural Gas Section of the American Gas Association requested the Bureau of Mines to undertake a complete study of freezing in natural-gas pipe lines, with particular reference to the formation of hydrocarbon hydrates. Arrangements were made for a cooperative study of the problem, and the investigation was begun in the fall of 1935. Reports relating to the Bureau's work on this problem have been presented at various times before the Natural-Gas Section of the A. G. A.[2,3,4]

A review of the literature at the beginning of the Bureau's study revealed that little material was available. With the exception of Hammerschmidt's article, previously mentioned, the only information on the subject was in foreign publications. The earliest published work found was that of Villard,[5] a French investigator, who in 1888 published an article on the hydrates of methane and ethane.

W. M. Deaton

Pipe-Line Temperature Survey

At the beginning of the study it was recognized that the formation of hydrates in a pipe line was a function of the pressure and temperature. To make available definite information concerning the temperature of underground pipe lines, the Bureau made a pipe-line-temperature survey. Recording thermometers were installed at several points along a 22-inch pipe line extending north from the Texas Panhandle. Some of the results of this survey were presented at the meeting of the Natural-Gas Section, American Gas Association, in Kansas City, Mo., in 1937.[3] This survey was continued for some time and has been augmented by the installation of continuous recording instruments at the Bureau's stations at Amarillo, Texas, and Laramie, Wyo. These instruments record the atmospheric temperature, surface ground temperature, and underground temperatures at depths of 6 inches, 18 inches, 3 feet, 6 feet, and 10 feet. Continuous records have been obtained for nearly 3 years. These data are now being tabulated and arranged in graphic form for publication.

In general, the results of the temperature survey show that underground temperatures at depths of 3 feet or more do not change rapidly and usually are affected only slightly by temporary severe weather conditions. Unless affected by compressor stations or other disturbing influences the gas temperature is essentially the same as ground temperature at the depth of the center of the pipe line, hence it is affected by the depth to which the line is laid. The gas temperature varies along the line in accordance with the seasonal temperature of the region traversed.

Figure 1 shows, over nearly a year, the variation of gas temperature and the average daily atmospheric temperature for a point on a pipe line in Colorado. It will be observed that the lowest temperatures occurred during the latter part of February and the first part of March and the highest during the latter part of August and the first part of September. At this location the center of the pipe is at a depth of 47 inches. The underground temperature at the depth of the center of the pipe also was recorded at this station but agreed so closely with the temperature of the gas that it is not distinguishable as a separate curve. The difference between ground and gas temperature at this point was not more than one degree at any time during the year. This same conformity of gas temperature and ground temperature at the depth of the center of the pipe line was observed at other temperature-measuring stations.

Usually more trouble from hydrates is experienced during the latter part of the winter season or early in the spring. This may be attributed to several causes. First, the lowest ground temperatures prevail during the late winter period; second, slow and unrecognized accumulations of hydrates over the winter period finally may cause serious trouble at this time of the year; and third, in the early spring after the ground has started warming up, the higher temperatures may cause hydrates present in the pipe line to be released from the pipe walls and fall into the gas stream to be moved to points of constriction, causing plugging in the line.

Laboratory Studies

In the course of the Bureau's laboratory studies, the hydrate characteristics of a number of natural gases have been determined. These include gas from the Kettleman Hills field in California. Although the mild temperatures that prevail in California tend to abate the danger of difficulties due to gas hydrates, the hydrate curve for the Kettleman

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a. Published by permission of the Director, Bureau of Mines, United States Department of the Interior. (Not subject to copyright.) Presented before the California Natural Gasoline Association, Los Angeles, Calif, September 15, 1939.

b. Physical Chemist, Bureau of Mines, Petroleum and Natural-Gas Division, Amarillo, Tex.

c. Associate Chemist, Bureau of Mines, Petroleum and Natural-Gas Division, Amarillo, Tex.

d. The numbers refer to the references at the end of the paper.

Hills gas shows that hydrates will be formed by this gas more readily than any other natural gas tested thus far. Figure 2 presents gas-hydrate decomposition curves for Kettleman Hills gas, several other natural gases, and ethane and propane. The analyses of the gases are given in Table 1. It will be observed from the curve for Kettleman Hills gas (curve C) that hydrates will form at temperatures of 50° F. at pressures less than 300 pounds per square inch.

In the laboratory study of hydrates, an apparatus is used that will permit visual observation, within a high-pressure cell, of the reactions that occur. In these experiments the hydrate is observed to accumulate on the surface of the water. As gas is passed over the water surface, hydrates form as a tough, flexible film over the entire surface; then the formation ceases or at least proceeds very slowly. As gas is bubbled through the water the bubble surface is transformed into a film of hydrate. These observations suggest that the formation of hydrate is a surface reaction.

Sometimes in the laboratory experiments it has been difficult to get the hydrates to form, even though temperature and pressure conditions favor their formation. This situation may prevail for an indefinite period of time but when, by some circumstance, crystallization starts it proceeds rapidly. This is analogous to the subcooling of water before it freezes or to the super-saturation of solutions before crystallization begins. Although this behavior has been demonstrated repeatedly it probably offers no advantage in the operation of pipe lines because the phenomenon is transitory and there is no assurance that conditions will not occur to initiate the formation of hydrates.

Referring to Figure 2; if curve A, for pure propane, is extended to slightly higher pressure it will cross the vapor-pressure line for propane at about 42°F. and 82 pounds per square inch absolute. Although the chart shows no determined points in the liquid-phase region, during the course of the experiments with pure propane hydrates were obtained when propane was present in the liquid phase. The difficulty of obtaining an exact value for the decomposition point for propane hydrates under these conditions made it undesirable to indicate these data on the chart.

Curves D and E show the effect of the natural-gasoline constituents on the hydrate characteristic of gas. Curve D represents the inlet gas to a gasoline plant and curve E the outlet gas. From these curves, it may be concluded that in the removal of the gasoline constituents the gas becomes less susceptible to hydrate formation. It would follow from this that the presence of condensed hydrocarbons, if they are capable of forming hydrates, might make it more likely for hydrates to form. It is conceivable, however, that condensed gasoline lying on the surface of condensed water in a pipe line might offer some protection against the formation of hydrates owing to the fact that it separates the gas from the water surface.

No very satisfactory analyses of the gas contained in natural-gas hydrates has been made. Analysis of gas collected during the course of the decomposition of hydrate mass was reported by Hammerschmidt.[1] He states, however, that this gas was collected following the depressuring of the pipe line and removal of the hydrate from the line. It is questionable whether gas obtained under these circumstances would be truly representative of the gas combined as gas hydrates under high-pressure conditions. In the course of the Bureaus studies, attempts have been made to obtain samples of the gas released by hydrates when they are isolated under pressure and then allowed to decompose. This task has been so difficult that reliable data cannot be presented at this time.

In the experimental hydrate apparatus, it has been found that reducing the pressure below the decomposition pressure for the existing temperature invariably causes decomposition of the hydrates Frequently the hydrates do not completely decompose immediately, and often a small, indefinite amount of hydrate persists for a considerable time, even after the pressure is reduced to atmospheric. This hydrate which fails to decompose either is submerged in the water in the cell or completely covered by a water film. Under these circumstances, the hydrates are no longer in a solid, compact mass but appear more as slush ice. Eventually, they decompose completely though they may persist for a considerable time.

Remedial Methods Used in the Field Application of Heat

Methods most commonly used in the field to free a line from gas hydrates are application of heat, use of alcohol, use of ammonia, and reduction of pipe-line pressure.

As pipe-line stoppages during the winter were commonly supposed to be caused by the freezing of water, one of the earliest methods used to remove such a stoppage was to apply heat to the line. Although effective in certain instances, the use of this method when an open fire is used is fraught with considerable danger because of the fire hazard involved. The danger associated with such a practice cannot be over emphasized. Many times the pipe line is "fired" by burning combustible materials in close contact with the pipe, but if great care is not taken the pipe may be heated to a point where it will rupture. This invariably results in a serious fire owing to the escaping gas and may result in more serious damage. During the past season at least one such accident occurred, resulting in the death of two workmen. Furthermore, unless the position of the freeze can be determined exactly, the application of local heat to the pipe line is an ineffective method of

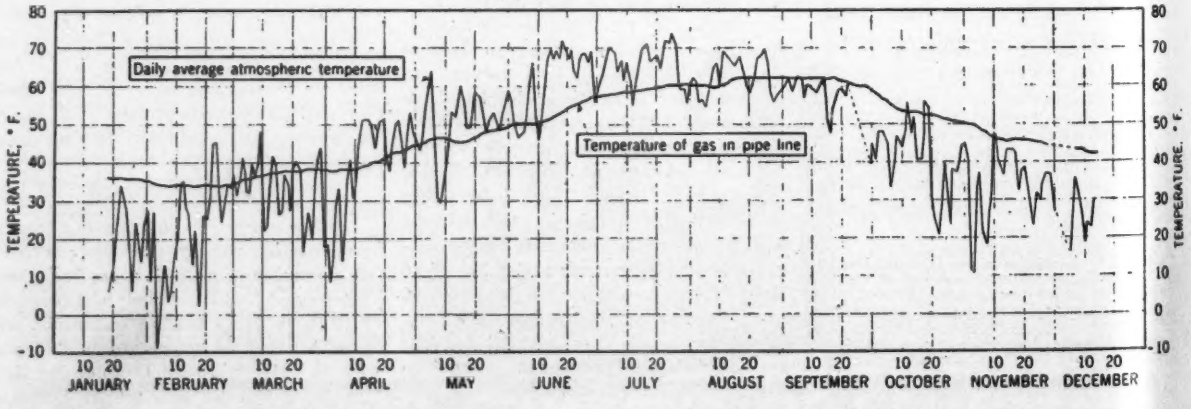

Figure 1. Variation of Atmospheric and pipe-line temperature at Black Forest thermometer station.

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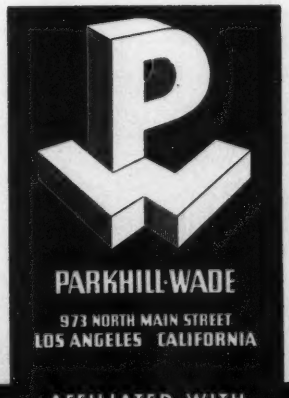

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relieving the stoppage, because it is difficult for the gas to absorb a large amount of heat unless an elaborate heating arrangement has been set up. Moreover, when heat is applied to the gas at some distance from the freeze, a considerable portion of the added heat is dissipated before the gas reaches the constriction. When the stoppage is almost complete there is very little gas flow, and consequently there is difficulty in transmitting the required heat to the point where it is needed. Even if the hydrates are decomposed by "firing" the line, the water resulting from the decomposition should be removed from the line as quickly as possible; otherwise, as soon as the pipe line returns to normal operating temperature this water may be reconverted into gas hydrates and result in a more serious stoppage than previously existed.

Use of Alcohol

When using alcohol to remove pipeline freezes, it usually is "lubricated" into the pipe line as a liquid, but if introduced into the line in this manner it is essential that the location of the freeze be determined rather definitely

Table 1

Analyses of Gases Used in Obtaining Curves of Fig. 2

	PROPANE		ETHANE		NATURAL GASES						
	A	B'	B	B'	C	D	E	F	G	H	I
Carbon dioxide					0.2	0.2	0.3	0.2	0.2	0.8	0.8
Nitrogen residue		4.2	0.8	2.6	1.1	9.4	9.5	14.3	7.2	25.0	0.2
Methane					87.9	78.4	79.4	75.2	82.5	67.4	98.5
Ethane	0.2	12.4	97.1	93.6	4.4	6.0	5.8	5.9	6.0	3.7	0.9
Ethylene				3.8							
Propane	99.8	83.4	2.1		4.9	3.6	3.6	3.3	3.2	1.9	1.8
Butane, iso					0.5	0.5	0.4	1.1	0.3	1.2	
Butane, normal					1.0	1.9	1.0		0.5		
Pentane and higher									0.1		
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

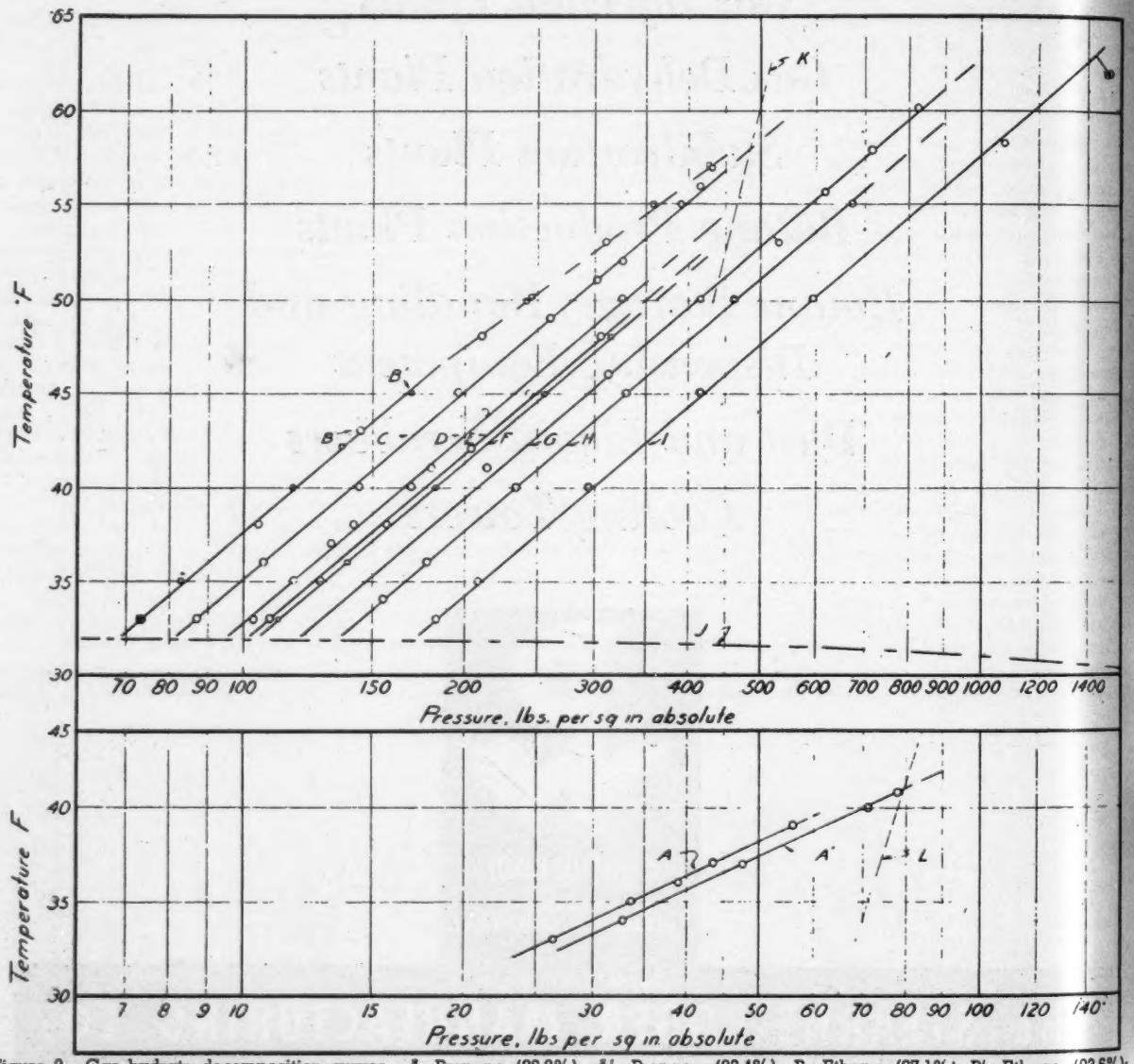
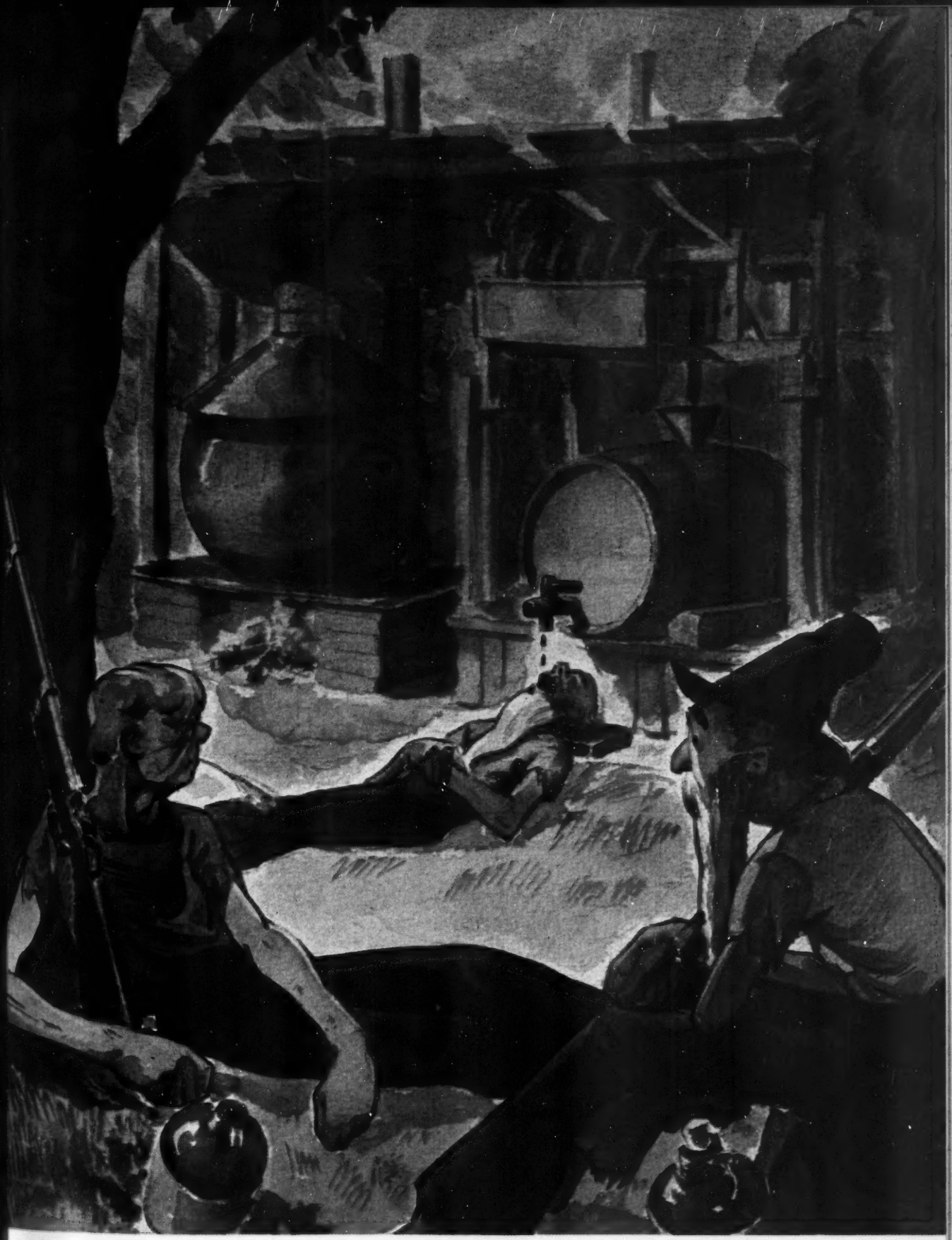
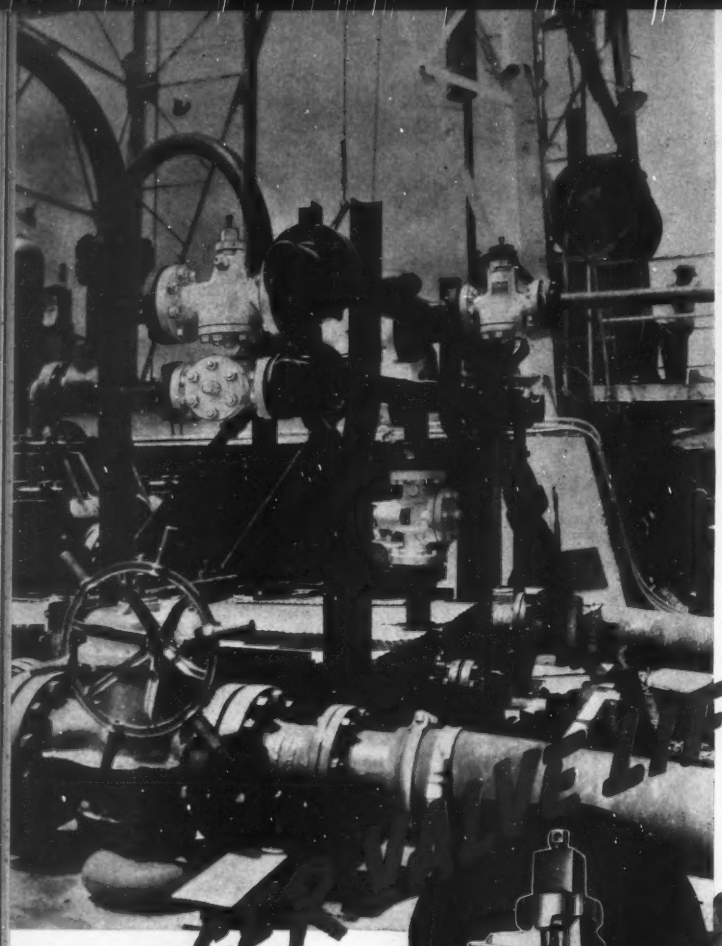
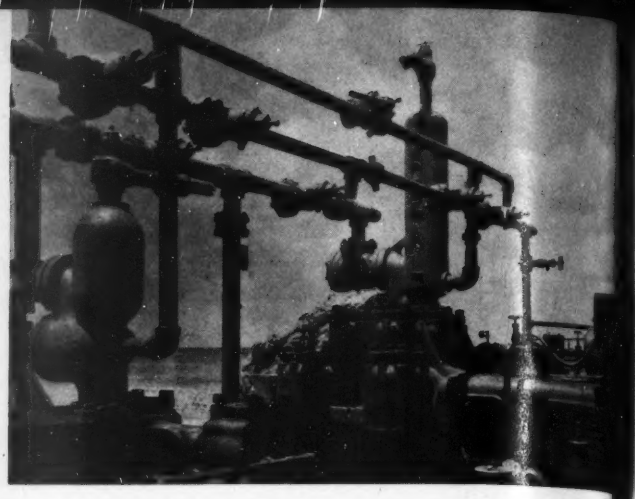


Figure 2. Gas hydrate decomposition curves. A, Propane (99.8%); A', Propane (83.4%); B, Ethane (97.1%) B', Ethane (93.6%); C, Natural gas, Kettleman Hills (California); D, Natural gas, Texas Panhandle, gasoline plant inlet; E, Natural gas, Texas Panhandle, gasoline plant outlet; F, Natural gas, Texas Panhandle; G, Natural gas, Texas Panhandle, Hammerschmidt's curve; H, Natural gas, Texas Panhandle, Cliffside structure; I, Natural gas, Cayuga (Texas); J, Melting point of pure water ice; K, Vapor pressure curve for pure ethane; L, Vapor pressure curve for pure propane.



"Ain't no ordnery plug cock what'll hold that likker, Luke. Reckon we gotta git a Nordstrom Plug Valve."





In these two photographs Nordstrom Hypreseal Valves are shown on the mud lines.

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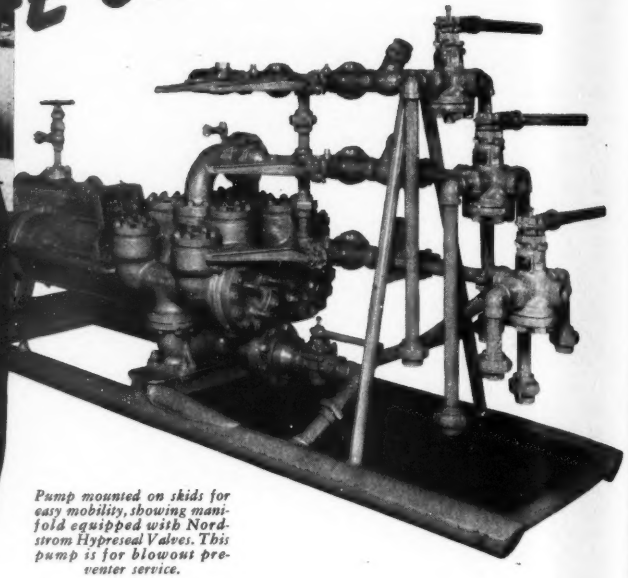

Pump mounted on skids for easy mobility, showing manifold equipped with Nordstrom Hypreseal Valves. This pump is for blowout preventer service.

Mud lines, with extra high operating pressures, are one of the most difficult valve services. Operators were accustomed to renewing mud line valves at frequent intervals until Nordstrom Hypreseals were adopted. Exact figures compiled by some of the larger operators prove that Nordstroms will endure on this service at least ten times longer than many other types. Nordstrom Lubricant No. 260, compounded especially for this service, provides a seal around the entire plug. This lubricant, in combination with the inherent characteristics of the valve, prevents channeling around the plug. Ask for Nordstrom Drilling and Production Bulletin.

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and the injection made at a point close at hand where the liquid alcohol or its concentrated vapors can come into contact with the hydrate mass. Hammerschmidt, in a paper[6] presented before the Natural-Gas Section, American Gas Association, in Tulsa last May, recommended the use of an atomizer when introducing the alcohol into the gas stream as a liquid or the introduction of alcohol into the pipe line as a vapor. His results indicated that under these circumstances alcohol could be used satisfactorily.

Use of Ammonia

In using ammonia to inhibit hydrates or to remove them from a pipe line, a common practice is to by-pass a portion of the gas over liquid ammonia in a separate container and thus introduce ammonia vapor into the pipe line. Some companies have used a lubricator or hydraulic pump to inject liquid ammonia directly into the pipe line.

In a paper presented before the Natural Gas Section, American Gas Association, in Kansas City, 1937, Russell[7] stated that the concentration of ammonia required, when used under the conditions of his test, was a minimum of 42 parts per million (p.p.m.) or 0.0042 percent by volume. As ammonia in the presence of water reacts with carbon dioxide to form ammonium carbonate or ammonium bicarbonate, in using ammonia as a hydrate inhibitor the carbon dioxide content of the gas is important. Field tests made by the Bureau in the course of its study of gas hydrates showed that, in a pipe line where ammonia was being injected continuously to prevent the formation of gas hydrates, most of the ammonia added was being removed from the gas by its reaction with carbon dioxide. During the tests the injection equipment was set for delivery of 150 p.p.m. of ammonia into the gas stream; however, circumstances did not permit analysis at the point of injection to confirm this figure. An analysis of the gas at a point approximately 150 feet downstream from the injector showed an ammonia concentration of 90 p.p.m. At a point approximately 1.5 miles downstream from the ammonia injector, an ammonia concentration of 15 p.p.m. was found. Analysis of the natural gas entering this line showed a carbon dioxide content of 0.2 percent. Tests of the drip fluid removed from this line showed the presence of ammonium carbonate and ammonium bicarbonate, but no free ammonium hydroxide was found. These tests indicate that the ammonia was reacting with the carbon dioxide and the resultant carbonate was being dissolved in the water which condensed in the line and was being removed from the line through the drips.

Tests using drip fluid from the pipe line investigated, containing approximately 5 percent ammonia combined as carbonates, showed that hydrates would form in the presence of this solution. An inhibiting effect on the tendency of gas to form hydrates was observed, however, for the hydrate decomposition point using the drip fluid was 192 pounds per square inch at a temperature of 35°F., whereas the decomposition point using water in contact with this gas was 127 pounds per square inch at the same temperature.

Ammonia has been used successfully by some companies to clear a pipe line in which gas hydrates had accumulated. A common practice is to inject a "slug" of liquid ammonia into the pipe line and to depend on the resulting high concentration of ammonia to decompose any hydrates present. The amount of ammonia required depends on so many variable factors that determination by trial is easier than by any other means. Success with this method has been reported when the ammonia could be injected into the line a short distance upstream from the hydrates.

Reduction of Pressure

When operating conditions permit, it has been found that reduction of the pipe-line pressure below the hydrate-decomposition pressure for the prevailing pipe-line temperature is very effective in decomposing hydrates that may have formed in the line. When such a method is used it is highly desirable to maintain a gas flow through the pipe line if possible and to remove all water that may be released upon decomposition of the hydrates. By maintaining the flow of gas in the line, heat from the gas will be supplied to localized hydrate accumulations, assisting in their decomposition.

The depressuring method was tried with excellent results following a freeze-up in an 8-inch lateral connecting Colorado Springs, Colo., with the 20-inch line. This lateral is approximately 6 miles long. The stoppage in this line was so complete that the pressure at the city-border station had dropped to about 170 pounds per square inch, while the main-line pressure was approximately 280 pounds per square inch. In this instance the pressure in the lateral above the freeze was lowered by closing the gate at the main line and allowing the city demand to reduce the pressure. As soon as the pressure in the lateral reached 100 pounds per square inch, the lateral gate at the main line was partly opened and manually operated to keep the pressure from dropping further. The line was operated under these conditions for about 26 hours. Full pressure was then restored to the line. Upon resumption of normal operation, the plug was observed to be entirely gone; in fact, the pressure-drop record between the main line and the city-border station showed that the plug had been relieved almost completely by the time the pressure reached 125 pounds per square inch. The time required to reach this pressure was one and three-quarters hours.

It has been observed that when a pipe line is depressured in a relatively short time there is a considerable drop in the pipe-line temperature owing to the expansion of the gas. Because of this it would be necessary to lower the pressure of the line to a value somewhat lower than would be required if the pipe line remained at the normal operating temperature, or to maintain the line at reduced pressure until the pipe-line temperature returns to normal.

Dehydration

Most of the methods of dealing with gas hydrates mentioned above are remedial rather than preventive. To eliminate the possibility of hydrate difficulties where pipe-line temperatures and pressures present this hazard, the most satisfactory treatment is to partly dehydrate the gas being carried by the pipe line. Where circumstances will permit, a dehydration plant is recommended. Many of the major pipe lines throughout the United States have installed dehydration plants at their initial compressor stations. All reports from these plants indicate that they are operating satisfactorily.

Several types of dehydration plants are in use; in one a calcium chloride solution, in another a mixture of calcium chloride, glycerine and water, and in a third diethylene glycol is employed as a contact liquid. The operation of these plants has been described in various articles[8 16] in the literature and need not be repeated here.

To study the performance of dehydration plants and to determine the percentage water saturation of a gas under pipe line conditions, use of a dew-point apparatus is desirable. In connection with the Bureau's study of gas hydrates a dew-point apparatus was developed which has been found satisfactory under most conditions. This apparatus was described in a paper presented before the Natural-Gas Section American Gas Association, in New Orleans, May 1938.[17]

The Bureau is continuing its study of gas hydrates and related subjects. Laboratory work investigating the fundamental nature of gas hydrates is in progress. Field tests are being continued to determine the most practical methods of dealing with the hydrate problem as it exists under conditions of production

and pipe-line maintenance. The study of remedial and preventive measures is being continued. Information on the operation of dehydration plants of various types is being collected.

The helpful cooperation of the natural-gas industry in the work that has already been done is highly appreciated, and its continued cooperation in furnishing information that will be of assistance in the problem is solicited.

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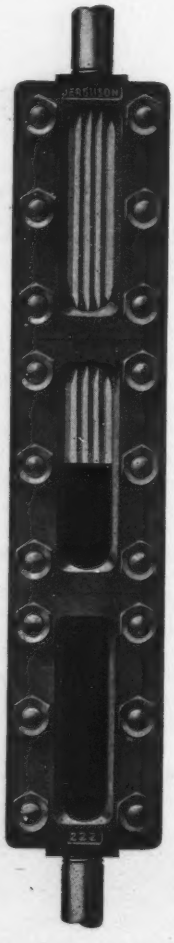
JERGUSON



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Paul L. Kelley Injured in Texas

California oil men will be sorry to learn that Paul L. Kelley, prominent Bakersfield operator and supply man, will be confined in an Amarillo, Texas, hospital until the first of the year as the result of an automobile accident. Mrs. Kelley, who received less serious injuries, has rejoined her husband after making a flying visit home.

F. R. Schmieder Goes to Ventura

In a recent personnel shift, Shell Oil Co. sent F. R. (Dutch) Schmieder to Ventura where he is in charge of operations and elevated M. G. Edwards to Division Manager at Long Beach.

Lowering the Decomposition Temperature of Natural Gas Hydrates

C. N. G. A.
September

By J. S. Powell, Jr.,
Southern California Gas Co.

In recent years laboratory studies on natural gas hydrates have increased greatly the knowledge of the chemistry of these substances. This knowledge has been of considerable aid in preventing and removing formations of hydrates in high pressure transmission systems wherein they obstruct the flow of gas. In 1934 the first comprehensive data on natural gas hydrates were published in a paper by E. J. Hammerschmidt (1). Later a paper by W. M. Deaton and E. M. Frost, Jr. (2) on gas hydrates confirmed much of Hammerschmidt's published data.

The natural gas hydrate is a solid substance, resembling snow in appearance. It is formed from the reaction of natural gas with water at temperatures as high as 60° F. and under pressures usually encountered in high pressure transmission systems. For their formation it is also necessary that the water be in the liquid state and that there be considerable turbulence of gas and water at the gas-water interface. The temperature of formation, which is also the decomposition temperature, is a function of the pressure and increases as the pressure increases (1).

Since the decomposition temperature is definite, the natural gas hydrate is probably composed of a homogeneous mixture of the hydrates of methane, ethane, propane, and isobutane, which are usually found in natural gas. Hydrates of these substances have been formed and it has been calculated that the formulae of methane, ethane, and propane hydrates are CH_4. $6H_2O$, CH_3CH_3. $6H_2O$, and $CH_3CH_2CH_3$. $7H_2H_2O$, respectively (1).

By maintaining the conditions under which hydrates will not occur their formation can be prevented. In practice this is done by operating above the hydrate formation temperature or by dehydrating the gas so that free water does not condense out. However, it is sometimes necessary to operate under hydrate formation conditions. Such a case now exists with the Southern California Gas Company in the operation of a direct contact cooler at Kettleman Hills. In this cooler water is condensed from saturated natural gas by direct contact with cold water. It is desired to operate the cooler at a gas pressure of 400 lbs. per sq. in. gauge and at a temperature

J. S. Powell

of 50°F. in order to obtain a dew point of the cooled gas near 50°F. Under these conditions hydrates occur readily. Deaton and Frost give the formation temperature of hydrates from Kettleman Hills gas at 400 lbs. per sq. in. gauge as 56°F. (2). Operating data indicate that the cooler can be operated at 53° F. without becoming plugged with hydrates. This is probably possible because at this temperature the hydrates formed at the top of the contact tower are carried to the bottom where they are decomposed by the relatively warm entering gas. At 50°F., however, the rate of formation is greater than the rate of decomposition and the contactor would eventually become plugged.

To make the cooler operate at this temperature, it would be necessary to reduce the hydrate formation temperature. A reduction of 4°F. would probably be sufficient. The most likely means of obtaining this lowering would be by the addition of some soluble substance to the water. Recently a paper was published by Hammerschmidt in which data were given on the lowering of the decomposition temperature of hydrates by aqueous solutions of non-electrolytes (3). It was pointed out that formation temperature lowering is directly proportional to the number of mols of the substance dissolved in a given volume of water, and is the same for all soluble substances which do not ionize or associate in solution. The mathematical relation given is as follows:

$$d = \frac{2335\,W}{100\,M\text{-}MW} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where d=depression in decomposition temperature in °F.;
w=weight percent of solute in solution;
m=molecular weight of solute;
2335=constant (K) as determined by Hammerschmidt.

A mol of a substance which ionizes is more effective than a mol of a substance which does not ionize, the effectiveness depending upon its degree of ionization and the number of ions formed by the dissociation.

The mathematical relation for substances, which ionize in solution is:

$$d = \frac{2335\,W\,(i\,(n\text{-}1) + 1)}{M\,(100\text{-}w)} \quad \ldots\ldots\ldots\ldots (2)$$

Where i=Degree of ionization of solute in the solution;
n=Number of ions formed by the dissociation of one molecule.

Purpose

The study of the lowering in the decomposition temperature of natural gas hydrates by aqueous solutions, with which this paper primarily deals, was undertaken in an effort to find some suitable inhibitor for the prevention of gas hydrates in the direct contact cooler. Since this study required the construction of an apparatus in which gas hydrates could be formed and their decomposition temperature and pressure observed, use was made of it in making a more general study of the nature of natural gas hydrates.

Apparatus

Referring to Figure 1, the description of the apparatus is as follows:

1. Lucite cylinder, 7" long, 1" I.D., 1½" O.D.
2. Glass cylinder, 4" O.D., 11½" long.
3. Centrifugal pump.
4. Ice reservoir.
5. Pump intake.
6. Solenoid valve.
7. A.C. relay.
8. Thermoregulator.
9. Overflow.
10. Mercury contact.
11. Valve.
12, 13. Gas inlets, ⅛" O.D. tubes, (copper).
14. Thermometer.
15. Bulb jacket and packing gland.
16. Pressure gauge.
17. Gas outlet.
18. Bath thermometer.
19. Pump discharge.
20. Bath.

The reaction tube, 1, is a cylinder of

100,000 H.P.

Three CLARK 4 cyl. 400 H.P.
Angle-Stabilized Seaboard Lube
Gasoline Plant, Texas

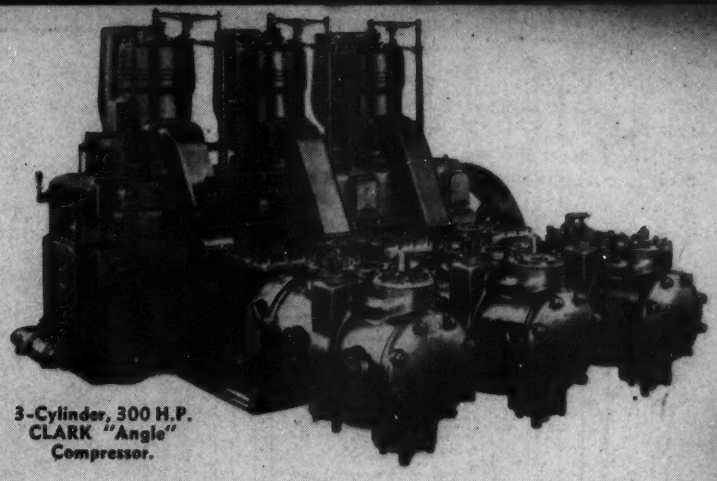
Four CLARK 4 cyl. 400 H.P.
Angle-Stabilized Seaboard Lube
Gasoline Plant, Texas

n 3 Years

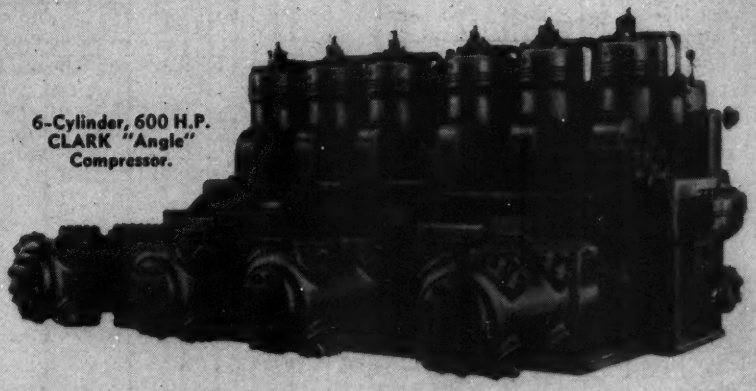
S SALES RECORD F CLARK "ANGLES"

month of September is particularly signifi- t to the CLARK organization because it rks the third anniversary of the shipment of first CLARK "Angle" Compressor units from factory. These initial orders covered some -H.P. units which were shipped to California Texas. Since then the line has been de- oped so that eight models ranging from 165 P. to 800 H. P. are now available in gas en- driven units. In addition to this, the full el unit has been developed in sizes from to 600 H. P.

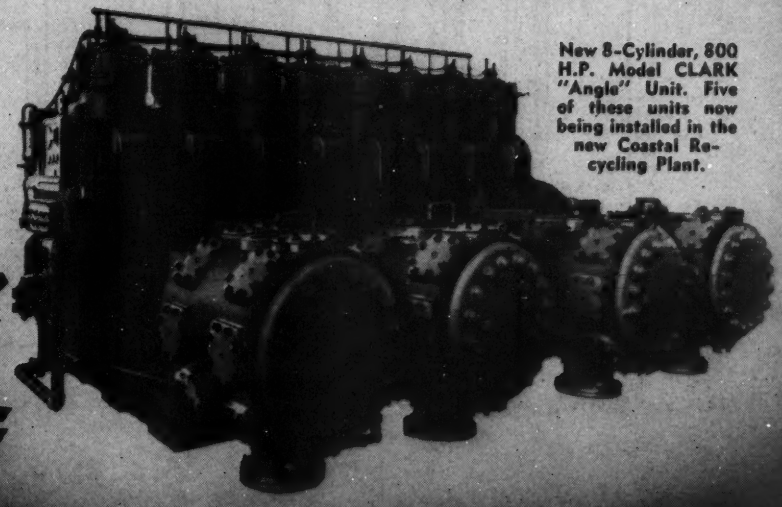
ring these 3 years, approximately 300 units, ling over 100,000 horsepower have moved the Clark factory into the oil fields of the ld. That the unit is increasing in popularity earning an enviable reputation in the field ttested by the fact that during the month of , 1939, seven different petroleum companies e us orders for 28 units totaling 16,650 H.P. greater part of these orders were repeat ers from satisfied users. We are naturally ply gratified by such conclusive evidence our efforts to combine the best of engineer- knowledge and design with the finest of terial and workmanship, in order to produce best compressor unit that can be built,—is preciated by our many friends in the petro- m industry.



3-Cylinder, 300 H.P. CLARK "Angle" Compressor.



6-Cylinder, 600 H.P. CLARK "Angle" Compressor.



New 8-Cylinder, 800 H.P. Model CLARK "Angle" Unit. Five of these units now being installed in the new Coastal Recycling Plant.

mith-Booth-Usher Co.

ANGELES, CALIF., PACIFIC COAST DISTRIBUTOR

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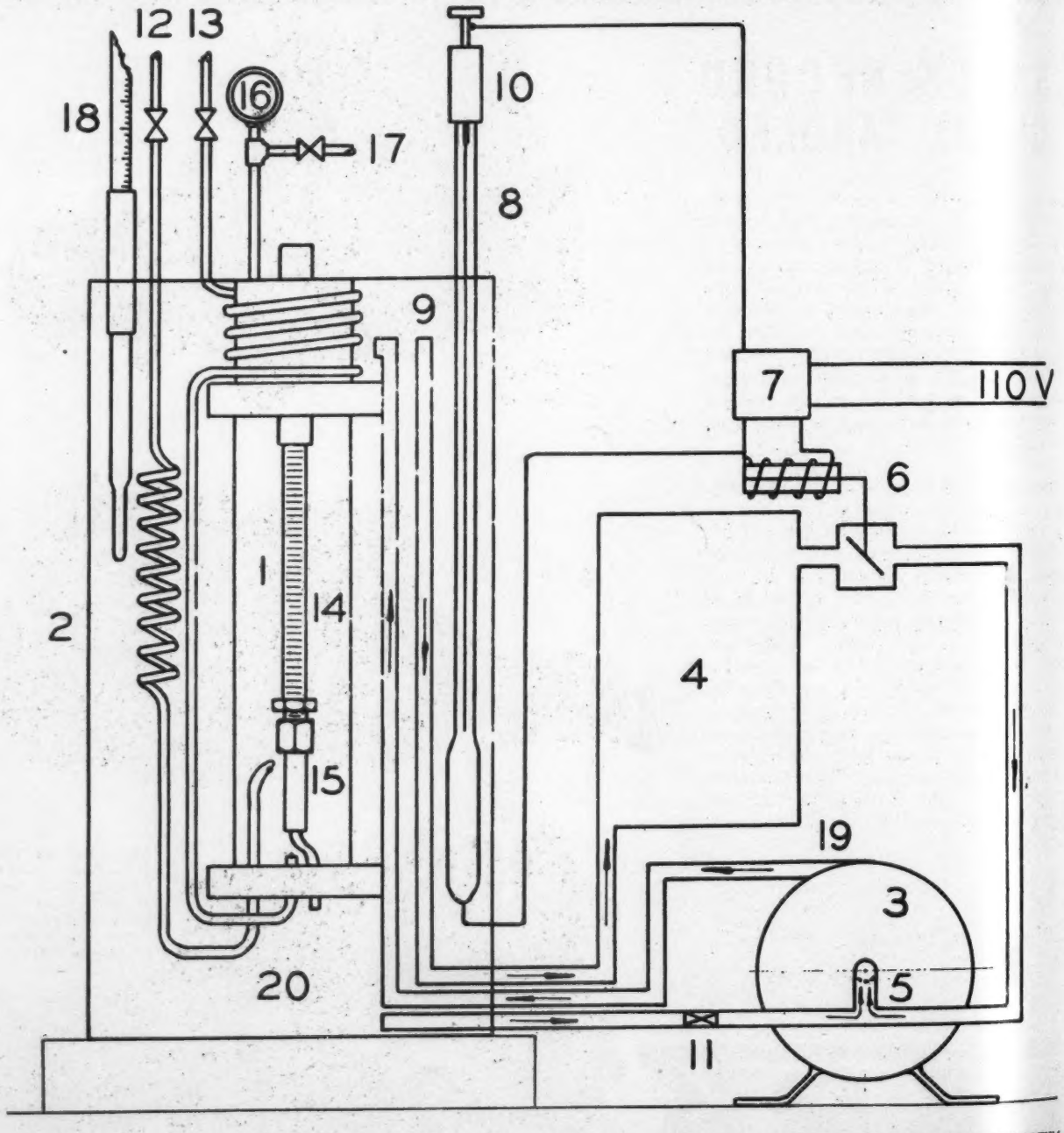
transparent lucite. It is enclosed within a glass cylinder, 2, which is the jacket for a constant temperature bath surrounding the reaction tube. The bath is maintained at any desired temperature between room temperature and 35° F. by means of a small centrifugal pump, 3, which circulates the water in the bath and also pumps in ice water from the reservoir, 4. The ice water flowing into the intake, 5, of the centrifugal pump is controlled by a solenoid operated valve, 6, which is actuated through the A.C. relay, 7, by means of the mercury thermoregulator, 8. The level in the bath is maintained by the overflow tube, 9, which returns bath water to the ice reservoir. The bath temperature desired is obtained within 0.2° F. by adjustment of the mercury contact, 10, and the valve, 11. Gas is introduced into the reaction tube through the inlet tubes, 12 and 13, which are coiled in the bath to allow precooling of the gas. The gas from these tubes is discharged from small orifices; their inlets being so located within the reaction tube that gas can be bubbled through a solution, or passed over its surface.

By means of a thermometer, 14, located within the reaction tube, the temperature of a solution therein can be determined. The bulb of this thermometer is guarded from the high gas pressure by a copper jacket and packing gland, 15. A small tube, from this jacket to the bath, maintains the bulb at atmospheric pressure. Fluctuations in the bath temperatures are not indicated by this thermometer; it can be read to an estimated 0.1°F. The gas pressure within the reaction tube is determined by a Bourdon tube gauge, 16, which is accurate to within 2 lbs. per square inch.

Operations

Ten to 15 ml. of solution are introduced into the reaction tube through one of the gas inlets. From a high pressure gas



cylinder, with regulator and valves not shown, gas is bubbled through the solution at pressures high enough to form gas hydrates. After forming, they are decomposed by depressuring. The pressure is then immediately increased to considerably above the hydrate formation pressure, and a stream of gas from the upper inlet is passed over the surface of the solution until a thin film of hydrate is formed. By depressuring slowly the decomposition pressure of this film can be observed to within about 2 lbs. per sq. in. at the temperature indicated by the inner thermometer. This method of determining pressure and temperature decomposition relations is essentially that used by Deaton and Frost (2).

Decomposition temperature and pressure data were determined for natural gas hydrates formed from the following solutions:

	Concentration, grams per liter
Distilled water	—
Ethylene glycol	50
Urea	50
Urea	100
Sodium Chloride	50
Sodium Chloride	100
Sodium Chloride	150

The composition of the natural gas used, as determined by a combustion analysis was:

	Percent by Volume
Carbon dioxide	0.5
Oxygen	0.3
Nitrogen	0.8
Methane	83.60
Ethane	14.80

In figure 2, are given the decomposition temperature and pressure data obtained for these solutions.

Discussion

It will be observed that a given weight of sodium chloride in solution lowers the decomposition temperature considerably more than the same weight of ethylene glycol. From an inspection of equation (2) this is what would be expected since sodium chloride and ethylene glycol both have nearly the same molecular weight, but, however, the sodium chloride is ionized in solution whereas ethylene glycol is not.

The explanation of the reason that a solute lowers the decomposition temperature of the hydrate is clear when one considers the phase relation in the system solid hydrate, liquid phase, and gas phase. This system is univarient, that is if the pressure of equilibrium is fixed the temperature is also fixed, and further at equilibrium the water vapor pressure of all three phases is equal. Therefore, if the vapor pressure of the liquid phase is lowered by the addition of a solute, some of the hydrate will decompose. This decomposition will cause cooling of the system until the vapor pressure of the hydrate, which changes more rapidly with temperature than does that of the liquid phase, is again equal to it.

From known values of the vapor pressure of sodium chloride solutions, it is possible then, by taking the data of Fig. 2 to express the vapor pressure of the hydrate as a function of temperature at various pressures. The mathematical relation between vapor pressure and temperature is given by the following form of the Clausius-Clapeyron equation:

$$\log p = \frac{A}{T} + B \qquad (3)$$

Where

p = vapor pressure;
A and B are constants;
T = absolute temperature.

From this equation it is then apparent that if the vapor pressure is plotted as a function temperature, with a logarithmic scale for vapor pressure, and a non-uniform scale for temperature, calculated from the inverse of the absolute temperature, a straight line will be obtained.

This is done in Fig. 3. Included is the vapor pressure curve for water. If

(Continued on Page 26)

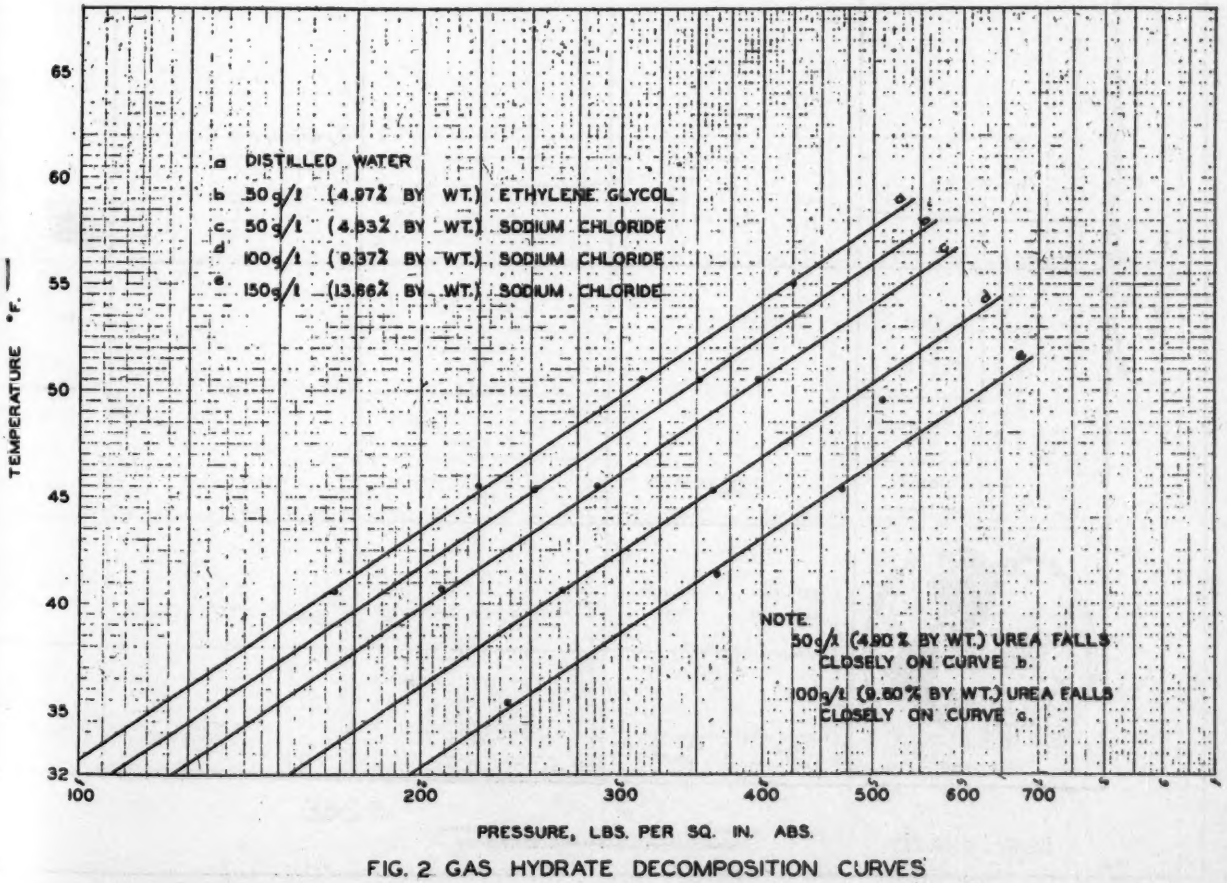
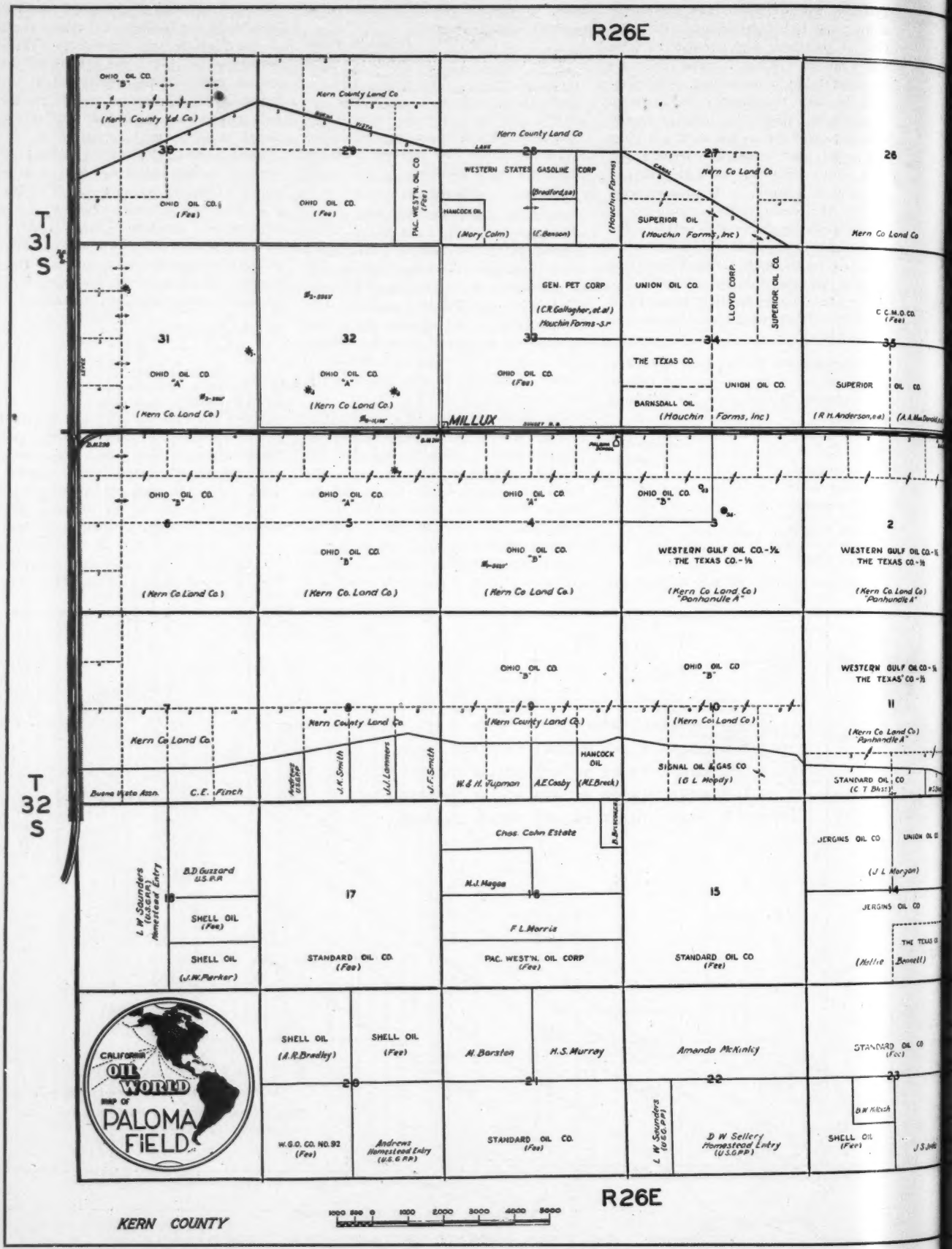


FIG. 2 GAS HYDRATE DECOMPOSITION CURVES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Kern County Land Co
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PAC. WEST'N. OIL CO. (Fee)
WESTERN STATES GASOLINE CORP (Bradford, ea)
HANCOCK OIL (Mary Colm)
(F. Benson)
(Houchin Forms)
SUPERIOR OIL (Houchin Forms, Inc)
Kern Co Land Co
GEN. PET CORP (C.R. Gallagher, et al) Houchin Forms - S.P.
UNION OIL CO.
LLOYD CORP.
SUPERIOR OIL CO.
THE TEXAS CO.
BARNSDALL OIL (Houchin Forms, Inc)
C.M.O.CO. (Fee)
SUPERIOR OIL CO.
(R.H. Anderson, ea)
(A.A. MacDonald, ea)
(Kern Co. Land Co.)
(Kern Co Land Co)
MILLUX
WESTERN GULF OIL CO. - 1/2
THE TEXAS CO. - 1/2
"Panhandle A"
Buena Vista Assn.
C.E. Finch
Andres Osuna
J.K. Smith
J.J. Lammers
J.F. Smith
W. & H. Tupman
A.E. Cosby
HANCOCK OIL (R.L. Breck)
SIGNAL OIL & GAS CO (G.L. Hopely)
STANDARD OIL CO (C.T. Bass)
Chas. Cohn Estate
M.J. Magee
F.L. Morris
L.W. Saunders (U.S.G.P.P.) Homestead Entry
B.D. Guzzard U.S.P.P.
SHELL OIL (Fee)
SHELL OIL (J.W. Parker)
STANDARD OIL CO. (Fee)
PAC. WEST'N. OIL CORP (Fee)
STANDARD OIL CO (Fee)
JERGINS OIL CO
UNION OIL CO
(J.L. Morgan)
(Hollie Bennett)
CALIFORNIA OIL WORLD MAP OF PALOMA FIELD
SHELL OIL (A.R. Bradley)
SHELL OIL (Fee)
M. Barston
H.S. Murray
Amanda McKinley
STANDARD OIL CO (Fee)
W.G.O. CO. NO. 92 (Fee)
Andrews Homestead Entry (U.S.G.P.P.)
STANDARD OIL CO. (Fee)
L.W. Saunders (U.S.G.P.P.)
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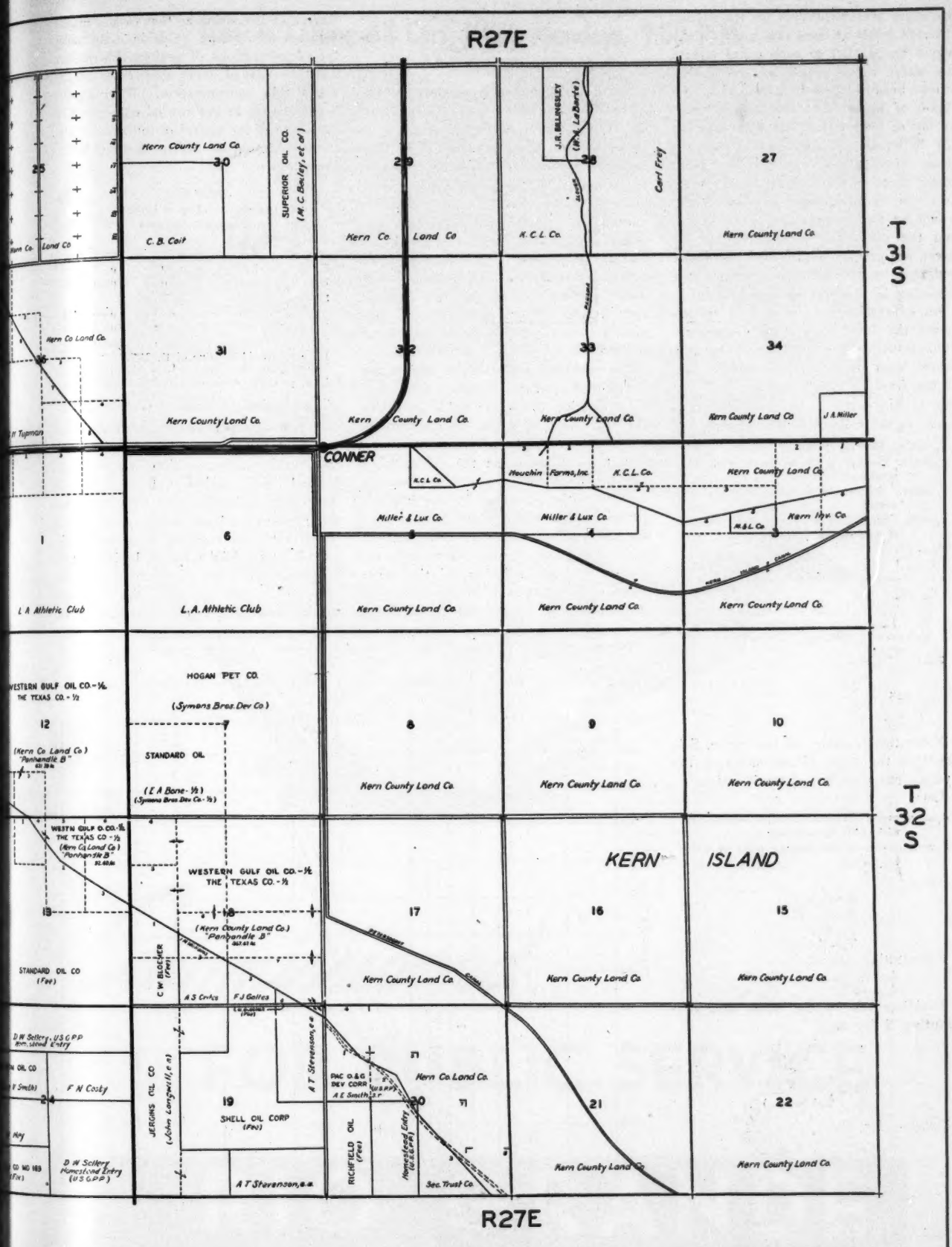
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Kern County Land Co.
C. B. Cait
SUPERIOR OIL CO. (M. C. Bailey, et al)
J.R. BELINGSLEY (W. A. LaBarre)
Carl Frey
K. C. L. Co.
Kern Co. Land Co
CONNER
Houchin Farms, Inc.
Miller & Lux Co.
J. A. Miller
L. A. Athletic Club
HOGAN PET CO.
(Symons Bros. Dev Co.)
WESTERN GULF OIL CO. - ½
THE TEXAS CO. - ½
(Kern Co. Land Co.) "Panhandle B"
STANDARD OIL
(E. A. Bone - ½)
(Symons Bros. Dev Co. - ½)
STANDARD OIL CO (Fee)
C. W. BLOCKER (Fee)
A. S. Crites
F. J. Gelles
KERN ISLAND
D. W. Sellers, U.S.G.P.P. Homestead Entry
F. N. Costy
JERGINS OIL CO (John Longwell, et al)
SHELL OIL CORP (Fee)
A. T. Stevenson, et al
PAC. O. & G. DEV CORP
A. E. Smith
RICHFIELD OIL (Fee)
Homestead Entry (U.S.G.P.P.)
Sec. Trust Co.
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the vapor pressure curves for the sodium chloride solutions were also plotted, they would be parallel to each other and to the water vapor pressure curve. This is true because the latent heat of evaporation of water from solutions is equal to that of pure water, and A in equation (3) is equal to a constant times the latent heat of evaporation. The point where these solutions curve would intersect the hydrate vapor pressure curve would be the temperature of formation, and the difference in temperature between the point of intersection for water and that for the solution would be the lowering in the formation temperature.

An expression can be derived to calculate the lowering of the decomposition temperature of a hydrate by any solute from its value for the lowering of the freezing point of water. Referring to Fig. 4, which has been drawn to assist in the following derivation:

T_w = abs. freezing point of water;
T_{s1} = abs. freezing point of water with solute present;
T_h = abs. decomposition temperature of hydrate;
T_s = abs. decomposition temperature lowering of hydrate by solution;

Then

$$\frac{1}{T_w}-\frac{1}{T_{s1}}=a_1 \text{ and } a_1=-\frac{(T_w-T_{s1})}{T_w\,T_{s1}}$$

$$\frac{1}{T_h}-\frac{1}{T_s}=a \text{ and } a=-\frac{(T_h-T_s)}{T_h\,T_s}$$

$$\frac{a}{a_1}=S$$

From the geometry of the figure, S is equal to the ratio of the slope of the hydrate curve to that of the ice curve.

Let:

d_h = depression in decomposition temperature of hydrate by solution;
d_w = depression of the freezing point of water by solute.

Then

$$d_w=T_w-T_{s1}$$
$$d_h=T_h-T_s$$
$$T_{s1}=T_h-d_w$$
$$T_s=T_h-d_w$$

Substituting above,

$$d_w=a_1\,T_w\,(T_w-d_w)$$
$$d_h=-a\,T_h\,(T_h-d_h)$$

Dividing one by the other and substituting S for $\frac{a}{a_1}$,

$$\frac{d_h}{d_w}=\frac{S\,T_h(T_h-d_h)}{T_w(T_w-d_w)}$$

Solving for dh,

$$\frac{T_w\,(T_w-d_w)}{S d_w\,T_h}=\frac{(T_h-d_h)}{d_h}$$

$$\frac{T_h}{d_h}=\frac{T_w\,(T_w\,T_w-d_w)}{S\,d_w\,T_h}+1$$

and

$$d_h=\frac{T_h}{\frac{T_w\,(T_w-d_w)}{S\,d_w\,T_h}+1} \qquad \ldots\ldots(4)$$

S can be calculated from equation (4) by substituting the observed value of d_h, T_h, and the value of d_w and T_w as obtained from the International Critical Tables. S will vary with the slope of the hydrate vapor pressure curve. Since Deaton's and Frost's decomposition curves for various natural gases are essentially parallel (2), it can be shown that if the slopes of the decomposition curves are equal that the slopes of their water pressure curves are also equal; and, therefore, S can be considered constant for most natural gases.

Equation (4) is applicable for any solution, whether it associates, ionizes, or hydrates in solution. It has an advantage over equation (2) which holds generally only for dilute solutions of electrolytes and non associating substances.

In table I are given the values of S and K as calculated from the observed values of the lowering in the hydrate decomposition temperature by the substances studied. It was necessary in order to make K, as determined for sodium chloride solution, of the same order of magnitude as K for urea and ethylene glycol, to use the value of the degree of ionization as that of a .1 molal solution of sodium chloride. Actually the concentrations of sodium chloride in solution ranged from nearly 10 to 30 times this concentration. This would indicate that in the use of equation (2) the value of the degree of ionization substituted should be that of a dilute solution.

TABLE 1

Solute	Concentration % by wt.	Deg. of Ionization used	S	K
Ethylene glycol	4.97	0	0.592	2140
Urea	4.90	0	0.615	2220
Urea	9.61	0	0.600	2170
Sodium chloride	4.83	0.86	0.635	2230
" "	9.37	0.86	0.613	2200
" "	13.66	0.86	0.578	2200

Hammerschmidt's value of K, 2335
Most probable value of K obtained, 2200
Most probable value of S obtained, 0.578.

Composition of Natural Gas Hydrate

A semi-quantitative determination was made of the volume of gas liberated from the decomposition of hydrate formed from a known volume of water. This was undertaken in the following way: twenty ml. of water were introduced into the reaction tube and converted into a solid mass of hydrate; the tube was then removed and cooled to 22°F.; and the pressure was reduced to atmospheric pressure. Under these

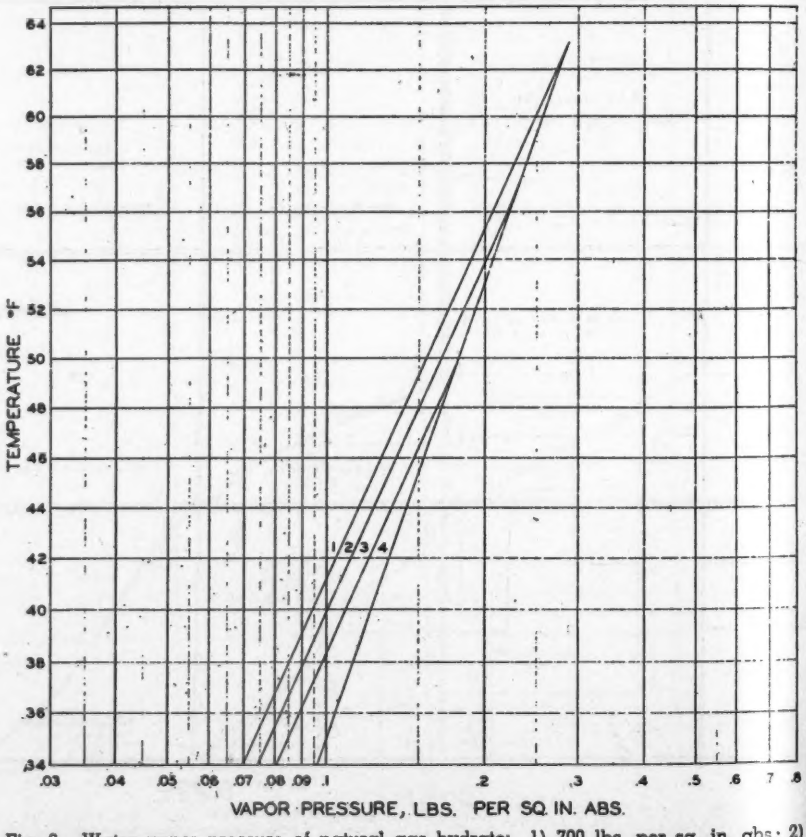

Fig. 3. Water vapor pressure of natural gas hydrate: 1) 700 lbs. per sq. in. abs.; 2) 500 lbs. per sq. in. abs.; 3) 300 lbs. per sq. in. abs., and 4) vapor pressure of water.

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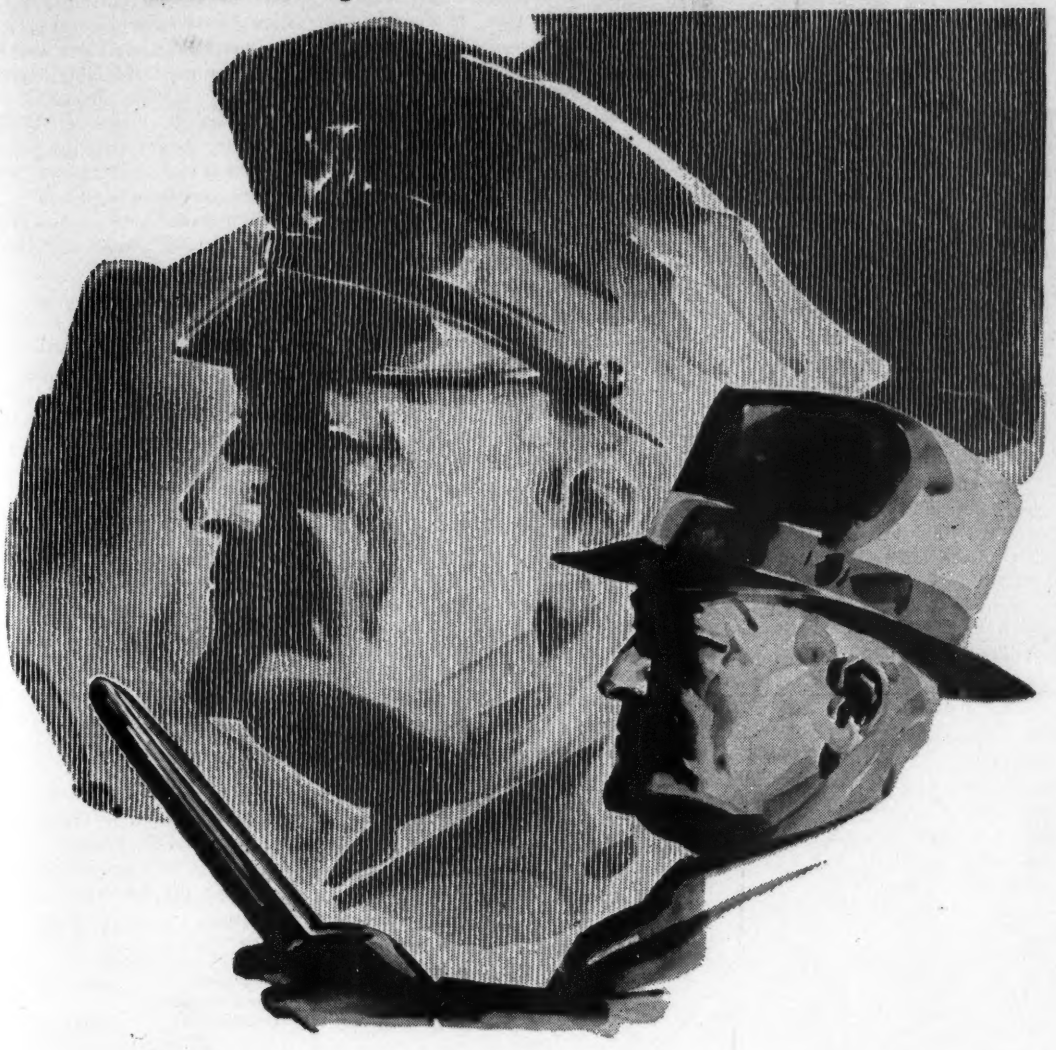

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conditions the hydrate was apparently stable. The outlet of the tube was then connected to a burette, and the hydrate was decomposed by warming the tube in a warm water bath. The gas evolved was 150 ml.

The approximate volume of gas, which should have been evolved if the hydrate molecule is composed of six molecules of water and one of gas, is 4000 ml. More than likely, the reason for this low value is that little of the water was actually converted into hydrate, most of it being trapped within the porous structure of the hydrate formation. It was intended to repeat the above determination, allowing the hydrate to remain in contact with gas for several days before measuring the volume of gas evolved in its decomposition, with the expectation that more gas would react with the water over this longer period. However, the apparatus was not suitably designed to properly conduct this experiment.

As was mentioned before, the hydrate formed from natural gas must be homogeneous. For this to be true, either the natural gas hydrate molecule must be complex, containing several different hydrocarbons, or it must be a solid solution of the hydrates of the separate components of the gas. It would be of interest to have a more definite knowledge of the composition of the natural gas hydrate, and of the equilibria which exists between the hydrocarbons in the solid and gas phases. This knowledge would be of aid in predicting the formation conditions of a hydrate from natural gas if its composition were known.

Applications

From an inspection of equation (2) it is apparent that in selecting a substance to prevent or remove gas hydrate formations that it have these properties:

Low molecular weight;

High degree of ionization.

Generally, substances which ionize are more corrosive than those which do not, especially where different types of metals are employed and galvanic action results. Usually the ionizable inorganic electrolytes are much less expensive and much more effective in preventing gas hydrate formation than the non-ionizable organic compounds. However, those suitable for use are usually solids which would prevent their use in many cases, such as in removing gas hydrates from pipe lines. A substance for this use should have such physical properties that its injection at one point would be effective over a considerable length of line. A highly volatile substance, soluble in water, would, therefore, be suitable in this case. Appropriate compounds would be methyl and ethyl alcohol. These compounds have been employed by Hammerschmidt under field conditions with success (3). To prevent hydrates forming in such equipment as cooling towers, refrigeration-dehydration plants, and in other equipment where hydrate formation is localized, the injection of a solution which could be circulated through the system would be practical. In this application a substance should be selected which would be non-volatile from solution in order to prevent its loss by evaporation. Suitable substances would be sodium chloride and ethylene glycol. Sodium chloride is the more promising because its cost is much less and it is twice as effective. Solutions of it should not be corrosive where the gas contains small amounts of oxygen and where there are no dissimilar metals in the system. The addition of a suitable corrosion inhibitor to the solution, such as sodium dichromate, would reduce its corrosivity.

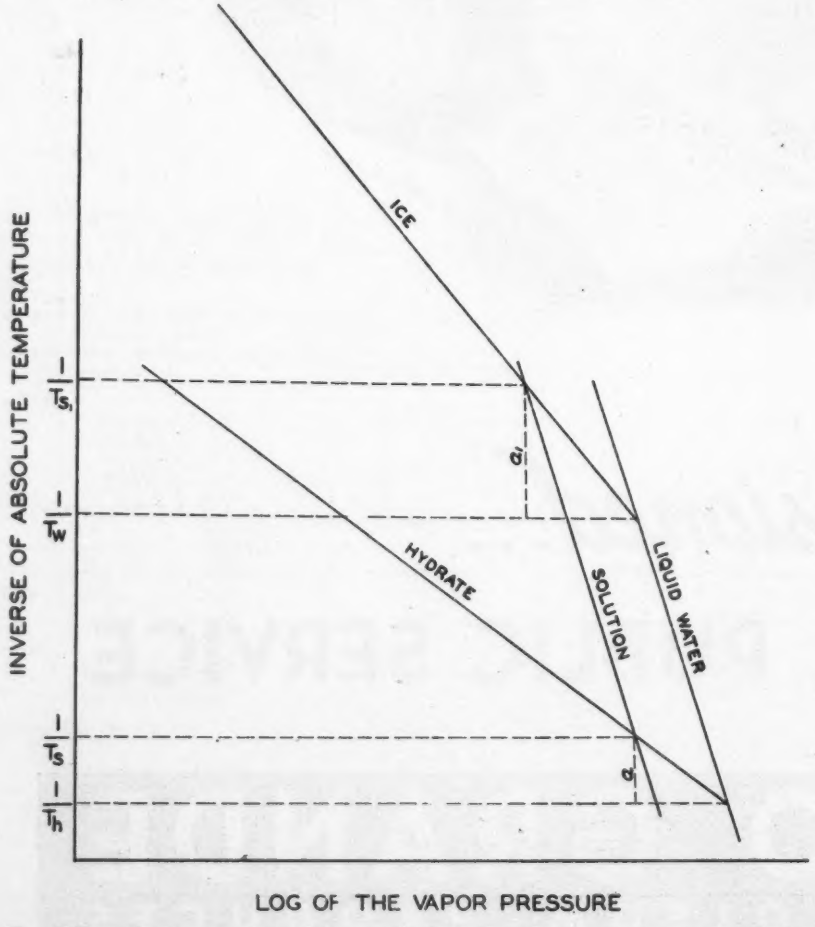

Fig. 4. Vapor pressure curves of ice, gas hydrate, liquid water and aqueous solution.

Using sodium chloride to prevent gas hydrate formation in the direct contact cooler mentioned, a sample calculation is given of the cost and frequency of treatment from the following data:

Gas volume .....38 M MCF per day;
Gas in .....60° F. saturated;
Gas out .....50° F. saturated;
Gas pressure .....400 lbs. per sq. in. ga.;
Volume of solution circulated .....200 gals.

Gas hydrate formation temperature from Fig 2.....54.8° F.
Lower limit of concentration of sodium chloride. Concentration of sodium chloride solution for a formation temperature of 50° F. from equation (2) using the value of K as 2200..... 6%
Upper limit of concentration of sodium chloride selected.....20%
Cost of sodium chloride per ton.....$13.00

The water condensed out into the solution by 38 M MCF per day of saturated gas at 400 lbs. per sq. in. ga., cooling from 60°F. to 50°F., is calculated from data on the water content of high pressure natural gas to be 39.6 gals. per day (5).

Let:

v=initial volume of solution in contact cooler in gals;
a=volume of water condensed from gas per day in gals;
d=number of days of operation before solution is returned to original volume;
w_o=initial weight of salt in v gals;
n=number of days of operation;
w_n=weight of salt at end of n days.

The weight of salt after the first draining is:

$$1st, \quad w_1 = w_0 \frac{v}{v + da}$$

$$2nd, \quad w_2 = w_1 \frac{v}{v + da}$$

$$3rd, \quad w_3 = w_2 \frac{v}{v + da}$$

Substituting above,

$$w_2 = w_0 \frac{(v)^2}{(v + da)}$$

Then after n days $\frac{n}{d}$ drainings,

$$w_n = w_0 \frac{(v)^{\frac{n}{d}}}{(v + da)}$$

Taking the log of both sides of the equation,

$$\log w_n = \log w_0 + \frac{n}{d} \log \frac{(v)}{(v + da)}$$

and

$$\frac{n}{d} = \frac{\log w_n}{w_0}$$

$$n = \frac{d \log \frac{W_n}{Wo}}{\log \frac{v}{v + da}} \quad \ldots\ldots\ldots\ldots (5)$$

From the data given:

$v = 200$ gals;
$w = .20 \times 1.1478$ (Sp. Gr. of sol.) $\times 8.33 \times 200$
$= 382$ lbs./200 gals.;
$w_n = .06 \times 1.0413 \times 8.33 \times 200 =$
104 lbs./200 gals.;
$a = 39.6$ gals./day;
d is taken as one day.
Then

$$n = \frac{1 \times \log \frac{104}{382}}{\log \frac{200}{200 \times 39.6}} = \frac{-.566}{-.08} = 7.08 \text{ days}$$

That is 7 days operation would require 382 — 104 = 278 lbs. of salt.

The cost per day would be, at $13.00 a ton for salt,

$$\frac{2.78 \times 1300}{7 \times 2000} = 26 \text{ cents.}$$

Summary

1. A portable apparatus for determining the decomposition temperatures and pressures of gas hydrates is described.

2. Decomposition temperatures and pressures are given for a natural gas hydrate.

3. The lowerings in the decomposition temperature of a hydrate by solutions of ethylene glycol, urea, and sodium chloride are given.

4. The water vapor pressure of a natural gas hydrate is given as a function of temperature.

5. Constant in the equation by Hammerschmidt for calculating the lowering in the decomposition temperature of hydrates by solutes in aqueous solution is determined. It is found to be slightly lower than the value given by him.

6. An equation is developed for calculating the lowering in the decomposition temperature of a natural gas hydrate by a solute in aqueous solution from the value of the lowering of the freezing point of water by the solute.

7. The basis for the selection of substances to prevent or remove gas hydrates is discussed.

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William A. Ross Heads Columbia Steel Company

William A. Ross was elected president of Columbia Steel Co., subsidiary of United States Steel Corp., at a meeting of the company's board of directors held in San Francisco. Mr. Ross succeeds Ambrose N. Diehl who resigned because of ill health and who has headed the steel company since 1932.

The new president of Columbia Steel has been connected with the steel industry since 1895, when he went to work for the old Washburn Moen Manufacturing Co. as an office boy. In 1899 Washburn Moen was acquired by American Steel and Wire Co. and Mr. Ross served the new firm as bill clerk and cashier. In 1911 the West Coast holdings of American Steel and Wire Co. became the Pacific Coast department of United States Steel Products Co., subsidiary of United States Steel Corp. Upon this new consolidation Mr. Ross was appointed assistant treasurer and then assistant to the vice-president of the Products company.

In 1930 Columbia Steel Corp. was acquired by United States Steel Corp. The Pacific Coast department of United States Steel Products Co. was then consolidated with the new enterprise under the name of Columbia Steel Co. with Mr. Ross serving as vice-president and treasurer.

By 1932 he was appointed vice-president and general manager of sales, in which capacity he served until his election to the presidency.

William A. Ross

With his resignation, Ambrose N. Diehl, retiring president of Columbia Steel Co., closes an active career of 40 years of service to the steel industry. Beginning in 1899 Mr. Diehl entered the employ of Carnegie Steel Co. as a chemist in the laboratory of the Duquesne Works. Rising through the various operations Mr. Diehl became assistant general superintendent of Duquesne Works in 1915 and operating vice-president in charge of the Pittsburgh District of Carnegie Steel Co. in 1918.

In 1930 he was made vice-president of United States Steel Corp. and in 1932 was sent to San Francisco to head the new Columbia Steel Co. as president.

British-American Adds Land and Lease Department

The British-American Oil Producing Co. has added a Land and Lease Department to its Los Angeles office to facilitate the handling of its California operations. Fred M. Keller has been placed in charge of this department effective Sept. 1, 1939, and will maintain his office at 722 Security Title Insurance Building, Los Angeles.

Mr. Keller has been actively engaged in the real estate business in Southern California for the past sixteen years, and, with his wide acquaintanceship, brings to his new work a broad experience and knowledge of the land and leasing business.

Field Development

San Joaquin Valley

Coalinga N. E. Area Expands

Completion of Bandini Petroleum's well No. 48-18, near the south quarter corner of sec. 18,19-16, brings the total of producing wells to four. Brought in under control flowing a 342 bbl. rate of 55 gravity oil, consisting mostly of condensate from the 12,000,000 cu. ft. of gas accompanying the flow, the well appears to be near the westerly limits of the area.

A half mile to the south, near the east quarter corner of sec. 19,19-16, Standard Oil Co. has run liner and is preparing to complete No. 73-19B. Bottomed in oil sand at 8270 ft. after reporting the top at 7955 ft., the well indicates that there is little north and south dip to the producing horizon thus far uncovered, and that the thickening of the siltstone overlying the Gatchell sand begins to the west of the Standard location. Standard has also made location for No. 51-19B near the north quarter corner of the same section as an offset to the Bandini completion.

Superior Oil Co. has entered the area with the pouring of foundation for Husong No. 1. Located near the east quarter corner of section 18, one location north of the recent Union completion, the well will be the most northerly of the active drillers.

Discovery of the shoreline deposit and development of the original production from section 17, is credited to the Amerada Petroleum Corp. With two wells flowing from the rich oil sands, the company is drilling S. P.L. No. 5-17 in Kreyenhagen shale below 7700 ft. Bottom is expected to be near 8000 ft.

Wilshire Annex Oil Co.'s well No. 64-30B, most southerly of the tests and located near the center of sec. 30,19-16, is also drilling in Kreyenhagen shale below 7500 ft. Production at this point would indicate that the areal extent of the pool is as large as the incredibly rich Coalinga Nose Pool, the northerly proved limits of which are some two miles south of the Wilshire Annex project. The possibility of direct connection between the two highly productive areas has not been completely ignored by many well qualified persons. Both are of the Eocene age and are shoreline deposits. These points, coupled with the fact that the area lying between them has never been prospected, leave ample ground for conjecture concerning the actual extent of each pool.

Texas Tests Humboldt Well

The Texas Co. is testing Eureka No. 3 in the Tomkins Hills Area with bottom at 5055 ft. A great deal of gas was found to be present on a test of the 7 in. casing at 3900 ft.

Shell Completes Strand Area Well

Shell Oil Co. has completed Ohio-KCL No. A-84-12, in sec. 12,30-25, flowing 3638 bbl. 34.6 gravity clean oil through two 64/64 in. beans. Slightly more than 2,250,000 cu. ft. of gas was produced with the flow. Shell's completion marks the entrance of a company other than the Tide Water Associated Oil Co., who until now was not only discoverer of the field but it's sole producer. Shell has announced plans to drill a second well immediately. The new driller will be called KCL No. B-75-12, site for which is being graded near the east quarter corner of section 12.

Tide Water Associated, with two producers in the field, is below 5000 ft. in it's third project, Strand—KCL No. E-46-7.

Vedder Tests Wet in Fruitvale Try

Meridian Petroleum Corp.'s Fee No. 2, deep test of the main body of the Fruitvale field, proved wet in the interval 7506 to 7535 ft. The well, located near the center of the northwest quarter of sec. 23,29-28, encountered the top of the Vedder sand at 7490 ft. During a formation test, salt water rose to within 90 ft. of the surface.

Top of the Santa Margarita was found at 4085 ft. while the main body of the Chanac, normal producing sand of the field, is behind 8⅝ in. casing cemented at 3545 ft.

Production in the Chanac is spotty in this field and the well will be tested in the upper intervals for commercial possibilities.

Standard Cases Yolo County Test

Standard Oil Co. is setting casing preparatory to completing Corcoran No. 1 in the Fairfield Area of Yolo County. With bottom at 3682 ft., a test was made from the top of the sand at 3662 ft. during which the blow was estimated at a 6,500,000 cu. ft. rate.

Ohio Oil Co. is rigging up KCL No. B-2-44-3 near the east quarter corner of the northwest quarter of discovery section 3. Further drilling plans are expected to be announced by other lease holders soon.

Wheeler Ridge Test Flows Salt Water

Richfield Oil Corp.'s KCL No. 1, located at the summit of Wheeler Ridge in south Kern County, flowed a 500 bbl. rate of salt water on a test of the interval 11,120-11,160 ft. The presence of

petroleum was attested only by a little gas and an oil scum on the water.

The well, which was a short term producer from the middle Miocene formations early in the year, was deepened to 11,168 ft. in the hope of finding a constant and dry producing horizon. Only ½ stand of oil has been recovered below it's original production at 8700 ft., at which point water came in too fast for commercial production. First oil sand encountered during the deepening processes was at 10,578 ft. and was classified as Oligocene. The oil sand continued in streaks of varying quality to bottom. Operators are plugging back to retest some of the upper sands.

Cantua Creek Boom Ended

Richfield Oil Corp's Turk No. 1, last survivor of a long string of Cantua Creek wildcat tests, has been abandoned. The well, located in sec. 4, 17-15 in Fresno Co., was drilled to 9000 ft., bot-

SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
Fresno County					
Cantua Creek	Richfield Oil Corp., Turk	1	4, 17-15	9000	Abandoned
Coalinga	Amerada Pet Corp., SPL	5–17	17, 19-16	7832	Drilling
	Bandini Pet. Co.	48–18	18, 19-16	8093	Producing
	Parkford, E. A. & Assoc.	45–24C	24, 20-15	7460	Drilling
	Rylatt, Harry E., Kipling	3	26, 20-14	2010	Plugged
	Standard Oil Co.	51–19B	19, 19-16		Location
	Standard Oil Co.	73–19B	19, 19-16	8270	Testing
	Stuart Oil Co.	1	12, 21-14	1410	Idle
	Superior Oil Co., Husong	1	18, 19-16		Foundation
	Wilcox, John F.	7	11, 20-14	350	Idle
	Wilshire-Annex Oil Co.	64–30B	30, 19-16	7496	Drilling
Fresno Area	Seth Turner	1	4, 14-19		Rig
Gatos Creek	Gatos Creek Oil Co.	1	19, 19-13	300	Idle
Kern County					
Antelope Valley	Par Petroleum Co.	1	32, 25-17	1613	Drilling
Buena Vista	Gen. Pet. Corp., B.V.A.	1	1, 32-24	8895	Drilling
	Richfield Oil Corp., B.V.A.	81–36	36, 31-25	5196	Drilling
	Shell Oil Co., B.V.A.	45–9	9, 32-25	3279	Drilling
Buttonwillow	Union Oil Co., Bowerbank	4–23	23, 29-24	5036	Drilling
Devil's Den	Herzog, Raymond D.	1	27, 25-18	710	Idle
	The Texas Co., Beer	1	6, 26-19		Rig
	Emigrant Hill Oil Co.	1	24, 25-18	4271	Idle
Edison	O'Rielly, Francis, Edison-Land	2	5, 30-29	3705	Drilling
	Petrex, Inc., Metro	2	6. 30-29	4203	Drilling
Grapevine	Richfield Oil Corp. KCL	1	28, 11-20	11168	Testing
	The Petrol Corp.,Reserve-Petrol	33–5	33, 11-19	9190	Idle
Greeley	General Pet. Corp., Sullivan	1	12, 29-25	9879	Drilling
	Standard Oil Co., KCL	12–5	7, 29-26	8597	Drilling
Kern Front	General Petroleum Corp., Mattei	1	19, 28-27	1751	Drilling
Midway	Baker, Leyse & Sonne	1	20, 32-23	2015	Drilling
Mt. Poso	Chevalier Oil Co., S.P.	4	3, 27-28	980	Drilling
	G. & V. Oils., Ltd.	1	35, 26-28	634	Abandoned
	G. & V. Oils., Ltd.	1A	35, 26-28	425	Drilling
Poso Creek	Crestmont Oil Co., McNeil	1	26, 26-28	2259	Drilling
Richfield Western	Richfield Oil Corp.	A-12-33	33, 30-25	9221	Drilling
	Standard Oil Co. KCL	21-1	19, 30-25	9977	Prep. to pump
Richgrove	Crusaders Pet. Corp., Quinn	1	9, 25-27	1475	Idle
	Dilamar Oil Corp., Quinn	3	15, 25-27	2902	Idle
San Emigdio	Bannow, Louis E., Irvin	1	15, 10-23	2044	Drilling
	Continental Oil Co. KCL	F-1	5, 10-21	8498	Drilling
	French, Mabel E.	1	14, 10-23	714	Idle
	Shell Oil Co. KCL	2A 52-13	13, 11-22	10935	Drilling
Strand	Continental Oil Co. KCL	D-2	14, 30-36	13250	Drilling
Trico	Trico Oil & Gas Co., Newland	1	29, 24-23		Rigging up
Upper Kern River	Kern Valley Drilling Co.	1	4, 29-29	1720	Idle
Kings County					
Strattford	P. W. Burnham & Assoc., Bartells	1	23, 20-20		Rig
Tulare Lake	Graphic Oil Co., Taylor	1	34, 23-20	4044	Idle
Tulare County					
Pixley	Compass Oil Co.	1	8, 23-26		Rigging up
Terra Bella	Arnold, V. F., Yellow King	1	9, 23-28	620	Idle

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toming in what is probable Cretaceous. A routine test of Eocene oil showings near the 8450 ft. level yielded only gassy mud.

The termination of this project ends for the moment a drilling program opened in 1929 by the Western Gulf Oil Co. and in which the Shell, Texas, Superior, Pure and Richfield Oil Co.'s have participated. In no case has a test in this area been abandoned until every potentially productive zone has been examined.

Texas Drills Beer Acreage

The Texas Co. jointly with Amerada Corp., is undertaking the drilling of a geologically important test in sec. 6,26-19. Located two miles southeast of the old Devils Den field and approximately four miles northwest of Amerada Pet. Co.'s development work, the well seeks production at relatively shallow levels. The test is also expected to clarify in some measure the complicated geology of the area long considered to be potentially oil producing. In consideration of The Texas Co.'s participation in the exploration work, Amerada is reported to have transferred an interest in the lease to it's co-developer.

Compass To Test Pixley District

Compass Oil Co. is rigging up its No. 1 for a test of the Pixley Area. Located near the center of the southeast quarter of sec. 8,23-26, the try is a little more than half a mile southeast of P. H. Osbornes Frame No. 1 which was drilled to a bottom in slate at 4773 ft. during 1931. A mile farther southeast, Seaboard Oil Corp. bottomed Security No. 1 at 4127 ft. in slate during 1937.

Texas to Drill Rio Vista Well

The Texas Co. plans to drill Welsh No. 1 in the Rio Vista Gas Field of Sacramento County. Location is in the northeast quarter of sec. 5,3n-3e.

Texas Redrills Jewett No. 2

The Texas Co. is redrilling Jewett No. 2 in the South Mountain View Field. After fiinding several bodies of poor oil sands, and drilling to the basement complex at 7722 ft., the well was plugged back to redrill directionally.

Standard Oil Co. is drilling below 4200 ft. in Jewett No. 2-5 on the discovery section. At the north edge of production, Richfield Oil Corp. has announced location for Mott No. 2 which will be drilled one location north of No. 1 on sec. 9,31-29.

Texas To Drill Shale Hills Test

The Texas Co. has announced plans to drill McLennan No. 1 near the northeast corner of sec. 19,27-19. The location, in the Shale Hills District, is near Texas' Mountford No. 1 which was drilled in 1938 to 2140 ft. Texas' Soloman No. 1 was drilled to 1925 ft. during the same year.

Hogan Rigging Mt. View Test

Hogan Petroleum Corp. is building rig for Wible No. 1 near the southeast corner of sec. 23,30-28. The project is apparently to be a westerly extension test of the fault accumulation from which production is already obtained in the Mountain View field.

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Los Angeles Basin

Montebello Development Shows Signs of Slowing

First indications of slowing development rate at Montebello were noted during the past week when notices for only two wells were filed while ten were being completed. The many recent completions reduced the number of drilling wells to 43, lowest in some time, while the number of projects preparing to drill has dropped to 11. It must not be assumed, however, that all activity will cease abruptly as there are many undrilled leases in proved territory, particularly in the westerly section of the field where operators are awaiting results of wells now drilling.

As the Eighth zone becomes more fully developed, talk is again heard of a new and deeper Ninth horizon. With drop of pressures becoming noticeable in some sections, many engineers are of the opinion that some operator will soon drill deep in search of new flush production to speed what may otherwise be a rather slow payoff in the Eighth zone. The noting of barren sand bodies in Union Oil Co.'s La Merced No. 30 below present producing horizons tends to show that if deeper production is found, it will be more limited in area than the Eighth whose extent is the largest of the deep zones.

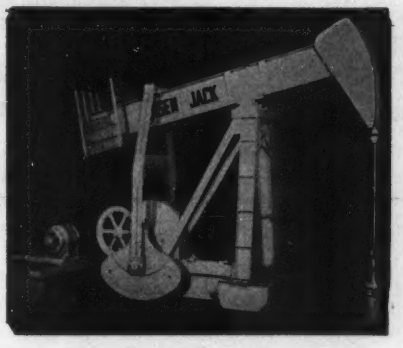
Several new engineering ideas have been tried and found successful in this field, the latest being a rather complicated hookup by which Kern Oil Co. Taylor No. 3 flows the Eighth zone naturally and gas lifts the Sixth. Production from the upper interval is 185 bbls. while the deep zone flows 630 bbls. and 1750 cu. ft. of gas.

Drilling activity by major companies is definitely on the wane, Standard Oil Co. having finished its program and Union Oil Co. having only four drillers. The Texas Co. is making slow progress with its Wilcox No. 1, westerly outpost test.

Independent concerns which recently completed wells include: Mission Oil Corp., Graham & Loftus Oil Corp., Kern Oil Co., Crail Bros., British-American Oil Producing Co., Ring Oil Co. and Wood-Callahan. An even dozen wells are below 7000 ft. and nearing completion.

Vulcan Abandons Del Rey Wildcat

Vulcan Oil Co. abandoned del Rey No. 1, wildcat well located on Lincoln Blvd. half a mile from the old Venice-



LOS ANGELES BASIN WILDCATS

Area	Well	No.	Section	Depth	Status
Castaic	Lang, Ed. W., Rupy	1	7, 5-16	510	Idle
Dominguez	California Western Oil Co.	1	32, 3-13		Rig
Gardena	Citizens Oil Co., Dunn	1	30, 3-13		Grade
Inglewood	Vanguard Oil Co., L.A.I.	1	29, 2-14		Rig
Mint Canyon	Redwood Oil Co., Mitchell	2	22, 4-15	247	Drilling
Montebello, West	Ridge Oil Co., Sea Cliff	1	3, 2-12	8039	Idle
Newhall	Mangrum and Page, Lintz	1	4, 3-15	352	Idle
	Tamas Oil Co., Perkins	1	11, 3-16	912	Drilling
Palos Verdes	Rolling Hills Pet.	1	27, 4-14	6220	Drilling
Playa del Rey	Vulcan Oil Co., Del Rey	1	22, 2-15	7347	Drilling
Potrero Heights	Owen O Oil Co.	1	36, 1-12		Cellar
Puente	Stabeck & Assoc.	1	14, 2-10		Rig
San Pedro	Sepulveda Oil Co.	1	23, 5-14	1100	Idle
Sunland	Casa Grande Oil Co., Lopez-Lundy	1	1, 2-15	1525	Drilling
Towsley Canyon	J. E. O'Donnell	1	8, 3-16	5225	Cleaning out
Whittier	C. W. Partridge, Hillside	1	22, 2-11	1780	Idle
	Taylor Drlg. & Prod. Co., Gregg	1	17, 2-11	6058	Idle
	Orange County				
Costa Mesa	Thompson, Milton N., Banning	1	9, 6-10		Rig
Olive	Morton & Elder	1	17, 4-9	628	Idle
	San Bernardino				
Carbon Canyon	Carbon Canyon Oil Co.	1	30, 2-8	256	Idle

NORTHERN COUNTIES WILDCATS

County	Well	No.	Section	Depth	Status
Colusa	Empire Oil & Gas Corp., Grandfather Finger Well	1	27, 14-5		Location
	Empire Oil & Gas Corp., Dunlap	1	36, 16-5	70	Drilling
Humboldt	The Texas Co., Eureka	3	21, 3-1	5067	Drilling
Monterey	Priest Valley Pet. Co.	1	20, 20-12		Rigging up
Sacramento	The Texas Co., Welsh	1	5, 3-3		Location
San Benito	Silver Creek Oil Co.	1	11, 17-11	160	Idle
San Joaquin	Utilities Pet. Co.	1	7, 1-6	3085	Drilling
Sutter	Buttes Oilfields, Inc., McPherrin	1	1, 15-1		Rigging up
Yolo	Standard Oil Co., Corcoran	1	29, 9-1	3682	Testing

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del Rey field. Some encouragement was felt for a time when oil sand was entered at 7303 ft. but when the body became definitely barren at 7340 ft., it became evident that the reservoir was insufficient and the project was given up at 7390 ft. The sand was quite coarse and appeared to be near the schist conglomerate toward bottom.

Report Activity In Signal Hill Field

Most important of the several wells now active in the Signal Hill field is R. W. Jerman's Dormax Oil Co. No. 1, located at the corner of 25th St. and Rose, is drilling for the 10,000 ft. sand. Bottom of the hole is now below 7500 ft.

Although unexpected difficulties hounded El Hondo Petroleum Co.'s try for deep production at the corner of Spring and American Ave., the well is reported drilling again after attempts had failed to redrill the old hole below 6000 ft.

Anaheim Pet. Starts East Coyote Project

First new development on the north side of the East Coyote field in some time was undertaken by Anaheim Petroleum Co. of Long Beach. Derrick has been erected approximately 900 ft. north and 900 ft. east of the southwest corner of sec. 13,3-10 on property of the Anaheim Union Water Co.

Exeter Oil Co. abandoned its westerly extension try, Stern No. 1, at 4585 ft. without testing stringers of oil sand found in the upper zones.

Oil Showing Reported On Rolling Hills Ditch

Rolling Hills Petroleum Co.'s wildcat, located at the north end of the Palos Verdes uplift, is again reported to be showing a little oil on the ditch while drilling. At 6220 ft., bottom was in Nodular shale which usually overlies the basement schist found productive in the El Segundo and Playa del Rey fields.

20 Strings Drill Wilmington Field

Second only to Montebello in point of activity, Wilmington has 20 wells actually drilling and enough new wells projected to keep that number of strings busy for months to come. Activity is general throughout the entire field, there being no "hot spot" at the present time.

Most extensive operator is Long Beach Oil Development Co. which is drilling six wells, all contracted to independent firms. The company will maintain this development rate until the ultimate 108 wells are on production.

Union Pacific Railroad, whose drilling is done by Hall-Baker Co., has three projects underway and has derricks up for three more.

Signal Oil & Gas Co. has only one sub-channel driller; No. 4 of the S. P. group. No. 3 was finished as a Terminal producer last week.

Simon Bernstein has filed a notice of intention to drill at the intersection of 12th and Harbor Sts. in the northeasterly portion of the field. The well will help determine extent of Ranger production.

On 7th St. west of Pico Ave., Interstate Investment Co. finished its Harbor No. 1 flowing at a settled rate of 100 bbls. a day of 15 gravity oil through a 28/64 in. bean. Three hundred and thirty feet of the Ranger zone is open to bottom at 3210 ft.

With perforations open in both Terminal zones, Hancock Oil Co. brought in No. A-23 flowing at a rate estimated close to 200 bbls. The well is Hancock's first harbor venture in several months.

On Terminal Island, Brookline Oil Co. completed No. 5 as its second well in the area. Although bottomed at

(P/A=S)
. . . OR DOES IT?

THIS SIMPLE FORMULA, load divided by area equals stress, serves well enough in the laboratory to establish the stress in a test specimen, but it fails utterly when applied to sucker rod strings under field conditions. In fact, no one yet knows much about the various load conditions to which sucker rods and couplings are subjected, hence there is no formula for calculating the endurance limit of a string of sucker rods in the well.

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3738 ft. in the Terminal zone, gravity of the oil is low and daily yield is only 150 bbls.

Tamas Oil Deepens Old Newhall Well

Tamas Oil Co., recently formed by Los Angeles men, has resumed drilling in an old well carried to 200 ft. in 1932 by Superba Oil Co. Located in sec. 11,3-16 near Newhall, the project is rigged with rotary equipment and is spot coring below 1000 ft. It is planned to deepen to 2000 ft. if productive sands are not located at shallower depths.

Needham No. 4 of Newhall Drilling Associates has been acquired by Consolidated Petroleum Co. of Beverly Hills. The old hole will be cleaned out and perhaps deepened. The Needham lease was originally developed by Southern California Drilling Co.

Seeking an extension of Barnsdall Oil Co.'s prolific Rancho San Francisco production, Newhall-Potrero Oil Co. is grading roads to drill in the southeast quarter of sec. 24,4-17. Barnsdall Oil Co. is completing No. 6, and starting preliminary work for No. 8.

Olive Wildcat Finds No Oil

Morton & Elder's Lorenzen No. 1, which started out as a water well, ended its career as just that. The project was said to have penetrated 75 ft. of oil bearing formation to 628 ft., but with a 4¼ in. combination string landed on bottom and cemented through perforations at 550 ft., only clear water was recovered.

Because of misleading newspaper publicity, throngs of people visited the project hoping to see the discovery of a shallow "poor man's" field in the Basin similar to Kern River. Lending some credence to the first optimistic reports was the location, which according to geologists, is not impossible for an accumulation of oil. Site of the test is in sec. 17,4-9, a mile south of Olive.

Island View Finishes Five Points Pumper

Completion of the fifth producer in the tiny Five Points field adjoining Huntington Beach was accredited to Island View Oil Co. whose No. 1 on the Day lease came in for 125 bbls. of 17 gravity clean oil. The well, bottomed at 4327 ft., and utilizing approximately 90 ft. of formation, is a southerly offset to J.E.F. Oil Co.'s Bruce No. 1.

One location north of its first well, Petroleum Oil Co. is rigging up to drill another which will be an easterly offset to Delaney's discovery well. North of the original producer, Owen Oil Co. is spasmodically drilling the project started by Reid Petroleum Co.

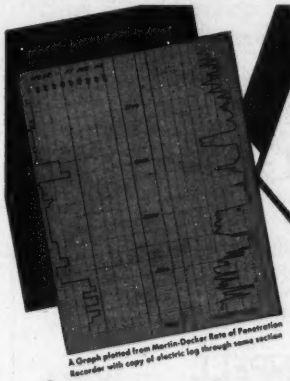
On the flat east of the old Huntington Beach field, T & T Oil Co. is attempting to obtain production from the old Standard Farnsworth No. 4, abandoned many years ago. Casing has been perforated at 3300 ft. for a production test.

New low-priced disposable fishing creel is made of cellulose material.

Great Northern Drills Richfield

Great Northern Oil Company yesterday spudded in the first of a four-well scheduled program on its twenty-acre lease in sec. 28-3-9 in Richfield. Production is expected between 6100 and 6500 feet according to Frank Lake, petroleum engineer. This project is 4000 feet west of Union's Chapman 29, the only deep producer in the field.

Oil has been discovered in Bahia, Brazil.


A Graph plotted from Martin-Decker Rate of Penetration Recorder with copy of electric log through same section

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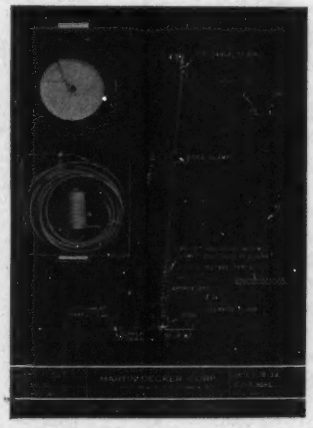

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Averill Abandons Rosecrans Outpost

Definitely terminating extension of the Rosecrans field to the south, Dr. George Averill's No. 3 found only a few stringers of oil sand in the O'Dea zone and was abandoned. The hole, carried to 7846 ft., was entirely barren below the top few feet of the horizon. Averill's first two wells, located to the north, are averaging a little over 200 bbls. a day between them.

The joint test of Barnsdall and Wilshire Oil Companies, Darling Comm. No. 1 is now the only hope of renewing interest in the field. Located south and west of the intersection of San Pedro and 154th St., the well found the O'Dea zone to consist of shale with streaks of oil sand and gray water sand. A formation test of the Lower O'Dea and Eighth Callender zones from 7755 ft. to 8027 ft. recovered gassy mud and water with a trace of oil. In hope of finding a new productive sand, deepening is in progress below 8507 ft.

Across the street to the north of Averill No. 1, Southern California Petroleum Corp. seems about to overcome its jinx and start making new hole, a late report stating redrilling was within a few feet of bottom, 6860 ft.

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Derrick Is Built For Newport Test

Almost as regular as if timed by clockwork, someone attempts to find commercial production in the Newport-Costa Mesa area. The latest to try is Milton N. Thompson of Long Beach, who has erected a wood rig near the northeast corner of Wilson and Placentia streets. The new test is about half a mile north of A. V. Oil & Gas Co.'s dry hole drilled to 4750 ft. last year. Several production tests in the latter well revealed no oil whatever, despite recently circulated rumors.

Small production has been obtained from a number of wells since the turn of the century, the area earning the title of Newport Oil Field during the early 1920's when daily average yield from a score of pumpers reached a peak of 119 bbls. a day. The oil was produced from the Puente or upper Miocene which appears to be monoclinal. Although several old wells which have not been properly abandoned still exude small quantities of heavy tar, none is on production at present.

Montebello Operators Fined For Contempt

Fines totaling the sum of $20,865 were assessed on August 31 by superior court Judge Emmet H. Wilson against oil operators and producers in the West Montebello field for having produced greater amounts of gas than allowed by an injunction previously issued. The action was brought by the state against all of the producers in the field under the terms of the gas conservation act. Preliminary injunctions were issued when the suit was filed by the state on May 28. Thereafter the injunctions were modified upon the report of a committee of oil engineers and geologists, each injunction specifying the amount of gas that might be produced daily from each well in the field. For the violation of these injunctions 12 defendants and their officers were cited for contempt.

In rendering judgment Judge Wilson stated that he had given consideration to the fact that the overproduction of some of the defendants was slight, and in their cases there was no apparent intent to disobey the order, while in other cases the overproduction was so long and con-

(Continued on Page 39)

Coastal District

British American Completes Bolsa Chica Hartman No. 8

British American Oil Producing Co. obtained its second good well in the Ventura Avenue field with the completion of No. 8 on the Bolsa Chica Oil Co.'s Hartman property. Bottomed at 8772 ft., and with the hole open below 7950 ft., the well was swabbed in flowing 1035 bbls. of 30 gravity oil cutting 4.0% and 1,250,000 cu. ft. of gas. With the flow bean reduced from 1 in. to ¾ in., production gauges 775 bbls. of oil and 1,200,000 cu. ft. of gas. The cut has cleaned up to less than 3.0%. The company's next venture will be No. 9, an offset to Tide Water Associated Oil Co.'s Hartman No. 8.

Most northerly of the drilling wells is California Alliance's Hartman Ranch No. 1 in the Avenue sector. Last reported bottom was 6200 ft.

Following up his discovery of a few months ago in the northeasterly section of the field, Ralph B. Lloyd is preparing to test water shutoff on 9⅝ in. casing cemented at 6505 ft. in well No. 3. Total depth is 7878 ft. Lloyd No. 4 is drilling below 7239 ft.

In the westerly area, Shell Oil Co. has five new wells started on the large Taylor lease, the deepest of which is No. 102 which cemented 7⅝ in. casing at 6195 ft.

Tide Water Associated Oil Co. has nine active wells representing almost every stage of development. Lloyd No. 111, a 10,258 ft. hole, was recently abandoned when continued efforts failed to make it a commercial well.

Third San Marcos Gone by the Board

The third attempt by Richfield Oil Corp. to find production in the San Marcos area of Santa Barbara county ended in failure with the abandonment of San Marcos No. 3 at 2500 ft. All three wells were located in close proximity to each other and were relatively shallow tests. No information has been released by Richfield on these wells and reports of oil showings are unsubstantiated rumors.

You are reading the Pacific Coast oil men's home paper.

COASTAL COUNTIES WILDCATS

Area	Well	No.	Section	Depth	Status
Santa Barbara County					
Capitan	Litho Oil Co., Rhode I.	1	4, 4-30	3015	Idle
Carpinteria	Carpinteria Oil Co.	1	32, 4-25	2458	Redrilling
Carreaga	Barbara Pacific Oil Co.	A-A 2	8, 8-33	6820	Idle
Foxen Canyon	Richfield Oil Corp., Tinaquaic	1	36, 9-32	5541	Idle
Gato Ridge	The Petrol Corp., Magenheimer	5–21	2, 8-32	4057	Drilling
Orcutt	So. Calif. Drlg. Co., Houck	1	9, 9-33	5002	Idle
Lompoc	Sun-Bell Drilling Co.	1	28, 8-34	2982	Drilling
Los Olivos	United Western Oil Co.	1	15, 7-30	3935	Plugging
San Marcos	Richfield Oil Corp., San Marcos	1	20, 6-29	1961	Idle
	Richfield Oil Corp., San Marcos	3	20, 6-29	2500	Abandoned
Summerland	Glenray Oil Co., Glenray	1	1, 4-26	90	Idle
	Oil Group, Inc., Hyland	1	16, 4-26	1315	Idle
	Topeka Oil Co.	17–1	22, 4-26	1770	Idle
San Luis Obispo County					
Elk Horn	Calif. Pet. Prod., Irons	1	19, 10-24	2425	Idle
	Newton, S. M., Stafford	1	18, 31-21	4892	Drilling
	Newton, S. M., Well	1	3, 32-21		Grade
	Temblor Oil Co.	1	22, 31-21	3465	Idle
Midway	Foster, Robt., A., McKee	1	2, 32-22	075	Cleaning out
Nipomo	Page Petroleum Co., C-M	1	15, 11-35	50	Drilling
Paso Robles	Epco, Inc.	1	27, 26-13	6200	Drilling
Ventura County					
Ojai	Coronet Oil Co., Coronet	1	17, 4-21	2298	Pumping water
Red Mountain	Martin, J. W.	3	15, 4-21	1900	Idle
Santa Susana	K. C. Oil Co., Marr	1	32, 3-17	710	Drilling
Sespe	Nevada-Fortuna Oil Co.	1	13, 4-19		Rig
	Renard Oil Co.	1	6, 4-19	300	Idle
	Speik Oil Co.	1	33, 5-19	3960	Idle
Shiells Canyon	Galveston Oil Co.	1	5, 3-19	3140	Rigging pump
	Shomy Oil Co., Shomy	1	32, 4-19	825	Idle
Simi	Levesque, G. M.	1	17, 2-18	2210	Idle
Tar Creek	Section 20 Oil Co.	1	20, 5-19	4157	Drilling

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Carpinteria Test Is Below 1565 Ft.

Sunset Oil Co.'s recently acquired Carpinteria well is redrilling below 1565 ft. with no comment by the company on oil showings. The well was drilled to 2458 ft. by Carpinteria Oil Co. more than a year ago in search of oil and gas sands found by other wildcats in the vicinity but never produced commercially.

Petrol to Test Gato Ridge Well

Nearing a production test is The Petrol Corp.'s only driller in the Gato Ridge field, Magenheimer No. 5-21. Bottomed in Monterey brown shale at 4048 ft., casing has been cemented at 1947 ft. and a liner is being run for final completion. The hole was directionally drilled from the surface location of No. 5-11. According to the operators, the slight additional cost of controlled drilling is more than offset by savings in road building.

Sun-Bell Tests Lompoc Outpost

Sun-Bell Drilling Co. is making a production test in its westerly outpost of the Lompoc field, located in sec. 29-8-34. With bottom at 2982 ft. and 8⅝ in. casing cemented at 2350 ft., the hole is being bailed to eliminate all drilling fluid and start the oil coming into the well.

U. W. May Abandon Los Olivos Wildcat

A long series of tests having failed to reveal any quantity of oil, United Western Oil Co. is said to be considering abandonment of its Bradley No. 1 in sec. 15-7-30, near Los Olivos. The well was drilled to 3935 ft. and, according to most observers, entered the Franciscan basement at approximately 2700 ft.

Coronet No. 1 Pumps Water

According to advice received from Ojai, Coronet Oil Co.'s No. 1, located in sec. 17-4-21, is pumping water from a depth of 2300 ft.

Only Two Wells Drill In Coastal San Luis Co.

In sec. 15-11-35, near Nipomo, Page Petroleum Co. has spudded its Callender-Mesa No. 1, while at Union, Epco, Inc. is below 6100 ft. These wells of affiliated companies are the only active projects in the coastal region of San Luis Obispo county.

Shiells Wildcat Again Testing

Basola No. 1 of Galveston Oil Co. is again being tested for production after a thorough clean-out job during which the old liner was pulled and a new one landed on the plug at 2990 ft. The operators hope to obtain a small well from the 180 ft. now open. Location of the project is in sec. 5-3-19.

Tar Creek Well Testing Eocene Sand

Section 20 Oil Co.'s deep test of the Tar Creek structure is holding the Ventura county limelight with its current production trial of Eocene sands. Hole has been bottomed at 4157 ft. and 6⅝ in. casing has been cemented at 3640 ft. over the sand body. From the appearance of cores, the project has a very good chance of developing paying production.

Union Oil Offsets Santa Maria Gusher

Union Oil Co. is preparing to drill an offset to Fred E. Cole's 4500 bbl. well in the southerly sector of the Santa Maria Valley field. The new Union project will be called O'Donnell No. 2-3 and will be drilled near the southeast corner of lot 12 of the Paderewski subdivision. The adjoining Cole well is now beaned back to 400 bbls. a day.

Mr. Cole has moved equipment from No. 19 and is drilling No. 20 one location to the south. Both wells are in lot 11 of the Paderewski tract.

In the erstwhile "hot spot" of sec. 27-10-34, S.M. Oil Co. is reconditioning Gerard-dal Porto No. 1.

Union Oil Co. is preparing to complete Squires No. 21 in the old Orcutt area having cemented a 7 in. water string at 3518 ft.

(Continued from Page 36)

tinuous that it indicated a total disregard of the court's order, and that the acts of those defendants were willful, intentional, deliberate and contumacious. Seven of the defendants were fined and citations against five were dismissed. On Sept. 5 two of the defendants appealed for writs of habeas corpus that would reverse the contempt of court decision, pleading that they had not wasted natural gas produced from their wells and that a market exists for the gas. Appellate Justices Thomas White and William C. Doran, of the District Court of Appeals are considering the appeal.

(Continued from Page 10)

Registration of members and guests will get under way in the Music room of the Biltmore at 9:30 a.m., Oct. 19. W. H. Geis, chairman of the petroleum division, will deliver a short address of welcome, while the first technical session will be presided over by R. P. McLaughlin, assisted by R. W. French, Jr., and John C. Young. The first morning meeting the following papers will be heard: "Problems of the Petroleum Industry," by Ernest K. Parks, consultant; "Must We Look for a New Reservoir Control?" by Stanley Herold, consultant; "The Effect of Rate on the Recovery of Oil by Water Flooding," by Dan R. Rankin, Peerless Pump Division; "Optimum Rate of Production of Oil," by H. T. Wyatt, Shell Oil Company; "Fundamental Phase Behavior of Reservoir Hydrocarbons," by John E. Sherborne, Union Oil Company.

Thursday afternoon, Oct. 19, with Harry Stolz, chairman, and assisted by Eldon N. Dunlap and F. G. Taves, the following papers will be delivered: "The Place of the Technical Library in the Petroleum Industry," by G. F. Olsen, General Petroleum Corporation; "Subsurface Trespass," by Mortimer Kline (Andrews & Kline, attorneys); "The Effect of Faulting on the Accumulation and Drainage of Oil and Gas in the Wilmington field," by Read Winterburn, Union Pacific Railroad Company; "Tideland Oil," by Gail Larkin, Southern California Edison Company; "The Ketteleman Hills Exhibits," by Martin Van Couvering, consultant; "The Buried Schist Surface of the

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Los Angeles Basin," by Eugene B. Waggoner, University of California at Los Angeles.

On the second day with R. E. Allen, presiding, assisted by Thomas A. Atkinson, and Floyd Merritt, assisting, these papers will be heard: "Young Engineers Organize," by Carlton Beal, Tidewater Associated Oil Company; "Some Aspects of Oil Appraisals," by Walker Clute, consultant; "Consumption Versus Normal Demand for California Crude Oil," by Allan H. Hand, petroleum economist; "Organization of Personnel in the Petroleum Industry," by E. De Golyer, consultant; "Geophysical Studies in California," by F. V. Vaughn, consultant; "The Effect of Temperature on the Plastering Properties and Viscosity of Rotary Drilling Muds," by H. T. Byck, Shell Development Corp.

V. H. Wilhelm, presiding and assisted by Carlton Beal and W. S. Eggleston, Friday afternoon, the following papers are slated to be heard: "Recent Changes in California Oil Curtailment Methods," by Joseph Jensen, Tidewater Associated; "General Views of the Navy on Conservation of Oil in California," by Admiral H. A. Stuart, U.S.N. Director Naval Petroleum Reserves; "Apparatus for Study of Pressure-Volume-Temperature Relations of Liquids and Gases," by B. H. Sage and W. N. Lacey, Calif. Institute of Technology; "Volumetric Behavior of Isobutane," by W. M. Morris, B. H. Sage and W. N Lacey, Calif. Institute of Technology; "Volumetric Pumping with Hydraulic Pumps," by R. N. Burnett, Petroleum Equipment Company; "Factors Influencing the Permeability of Reservoir Rocks," by A. J.

Outsiders do not know what is holding up Wilshire's Rio Bravo extension try. Campen No. 1.

Carlson and Max Eastman, University of Calif.; "Screening Effect of Gravel on Unconsolidated Sands," by Ben E. Gumpertz, University of California.

Among the other activities listed for the two-day session is a visit of members of the A.I.M.E. to the Columbia Broadcasting Station at Hollywood, this occuring at 8 p.m.

, Friday, at 7 o'clock p.m. the annual informal dinner will be held in the Music room of the Biltmore, sponsored by the Southern California Section, G. A. Joslin, chairman, presiding. Donald B. Gillies, president of the A.I.M.E., will speak on "Steel." D. C. Jackling and E. De Golyer, past presidents, will attend with the Institute Staff represented by A. B. Parsons, E. J. Kennedy, Jr., and Chester Naramore.

Richard H. Pence is chairman of the technical program committee, assisted by R. E. Allen, A. H. Bell, W. S. Eggleston, Hallan N Marsh, Ernest K. Parks, Stanley Herold, E. K. Soper, R. P. McLaughlin, Harry Stolz, R. W. French and W. H. Geis. Arrangements are to be handled by R. E. Swarthout, chairman, and Eldon Dunlap, Vic King, Lee Huebel for the Southern California Section.

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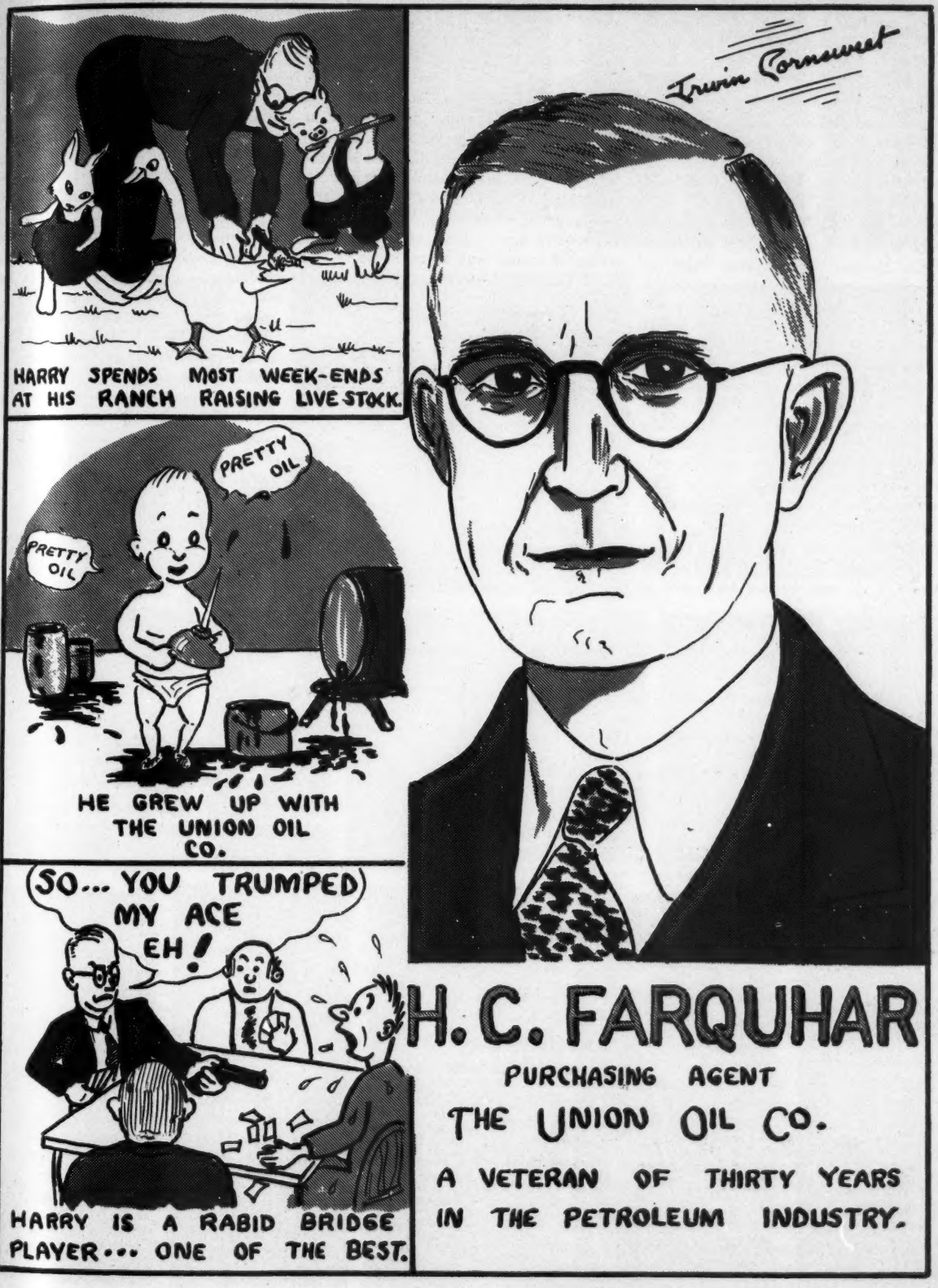
Irwin Cornwest
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C.N.G.A. October Meet Program Completed

Program arrangements for the Oct. 5 meeting of the California Natural Gasoline Association at Barker Bros. Bldg., 818 W. 7th St., Los Angeles, have been completed. The meeting starts at 6:30 p.m. The intellectual fare, according to Program Chairman Walter Dayhuff, includes a paper and a movie.

"Use of Air as a Cooling Medium in Gasoline and Compression Plants," by W. L. Rifenberick, Industrial Engineers Inc., Los Angeles, Cal.

Mr. Rifenberick will discuss the recently completed air cooled Barnsdall Oil Co. Newhall Compression Plant incorporating air cooling of the compressor unit and the compressed gas. Also, air cooling as applied to the engine jacket water system in Barnsdall's Rosecrans Plant will be reviewed. Results obtained in cooling gas, steam, water and oil will be presented and the principles involved in different types of air cooling systems will be revealed, including references to different types of cooling surfaces and various types of air prime movers. This is a paper that has an important bearing on plant design and operation.

M. W. Kibre of the General Petroleum Corp. and D. E. McFaddin of the Union Oil Co. will initiate discussion of the problem.

Picture: "Life of the California Condor," presented by J. R. Pemberton, Oil Umpire.

This highly interesting color picture, taken in cooperation with the U. S. Forest Service, had its first showing recently before the National Society of Ornithologists at Berkeley, Calif. Taken in Santa Barbara and Ventura Counties, the picture presents an intensive study and close-up pictures showing the life and activities of the "biggest bird that flies." It is understood that they are the first moving pictures ever taken of these birds and it is of historical interest because the bird is known as a vanishing species.

Streamline Rig For Coalinga Field

A new "Wilson Streamline Titan" drilling rig will soon be seen working at Coalinga Nose field, where Kern Drilling Corp., have a contract to drill the next well for Union Oil Co.

This should prove to be an interesting installation, as Tom Rowan and Ed Richards, company partners, say the rig is the latest word in internal combustion rigs, of streamline design and appearance and with air control of all speed and drum clutch shifting, Friction Latch brake lever and many other novel, up to the minute features.

The rig is powered with two 350 H.P. engines, which will operate on natural gas or butane fuel. It is rated to handle 12,000 feet of 4" drill pipe. The Streamline rig being new was routed direct from the factory to the Coalinga Nose field by rail.

It is an interesting fact that Kern Drilling Corp., recently made quite a drilling record with a Wilson Titan Rig at Montebello, while drilling East Montebello Oil Co.'s, first well. The time from spudding in to landing and cementing the casing at approximately 7550 feet was twenty-five days. Time of running this string of casing was seven hours.

Oil Geyser Off Pt. Fermin

Discovery of an oil gusher or geyser in action two miles west of Point Fermin on August 23 has been reported by the master of a lumber steamer to the United States Navy branch hydrographic office at San Francisco. The submarine gusher was spouting in 18 or 20 fathoms of water, and discolored water and oil were bubbling on the surface at 33:42:30 north latitude and 118:20 west longitude, according to the report. The discovery recalls the "pollution" troubles of the oil industry ten years ago, when beach cities blamed the oil companies and oil tankers for oil on beaches until ocean seepages were discovered.

Two wells have been drilled on Point Fermin in search of the long suspected oil pool. On the rocks below the bluff, Point Fermin Oil & Gas Co. attained a depth of 3735 ft. while about a mile to the northwest above the road, Los Angeles Harbor Oil Co. drilled to a little below 2000 ft. Neither encountered worthwhile showings.

As no attempts have been made to whipstock beneath the ocean bottom from Point Fermin, there still remains a chance of commercially producing the oil which in the past has been only a headache to the state fish and game commission.

Earl Sweetser Is Convalescent

Friends of Earl Sweetser, genial field superintendent for Thomas Kelly & Son, will be pleased to learn of his satisfactory recuperation from a stomach ailment at a Santa Monica hosiptal.

Piano finishes can be changed with a new material which permits using color schemes, patterns, or textures to suit any changes in room decoration.

Los Angeles Nomads Hear of Adventures

The Los Angeles Chapter of the NOMADS held their regular dinner for members and guests at the California Country Club in Culver City, Sept. 6.

One of the two speakers of the evening was Earl Rees of Fluid Packed Pump Co., who gave an exceptionally interesting talk on his experiences and observations on his recent trip to Sarawak, Borneo, and also traced the history and background of the present white rulers of that country. Incidentally, one of Earl Rees' remarks, regarding the now supposedly extinct custom of headhunting in that country is a classic. According to Earl, young men in Sarawak must "get a head to get ahead."

The other speaker was Capt. Jarvis of the British Navy who was in command of the Mystery Fleet operating in the Pacific Waters, which participated in several important naval battles during the World War. He gave an extemporaneous address which lasted the better part of two hours, following which he answered various contemporary questions having to do with the present European situation. Our space does not permit a full account of Capt. Jarvis' anecdotes and experiences, but if the amount of applause could be taken as a criterion as to the excellence of his address, it was undoubtedly one of the most enjoyable experienced by the members of the club.

→

Top row: Earl Boggess, Baker Oil Tools; Fred Ripley, Emsco; Ray Humphreys, Axelson; Jose Martinez, Y.P.F., and A. F. Driskill, B.O.D. Co., Ltd.

Second row: Blaine Johnston, Jr., M. O. Johnston; Mr. and Mrs. Nevin Walp, Caribbean Petroleum, and Tom Murphy, Martin-Decker.

Third row: Tom Martin, Lorraine Corp.; Ernie Smith, Bahrein Petroleum; Ben Beck, Caribbean Petroleum; Walter Seymour, Non-Corrosive Prod.; Ted Linton, Standard Oil of Calif.; George Firestone, Attock Oil Co., and C. A. Ricks, Caribbean Petroleum Co.

Fourth row: Knight Templeton, Security Engineering; Tim Firestone, Burmah Oil Co.; Earl Rees, Fuid Packed Pump Co.; Capt. Jarvis, and H. O. Rabsen, Trinidad Petroleum Development.

Ten thousand workers will soon be employed in a new oil field at El Hasa, Arabia. A port in East Arabia, to be opened by the Saudi Arabian Government will supply the field with shipping facilities.

NOMADS
and GUESTS

L A U G H T H I S O F F

According to **Jack Samuelson**, two gang men were having a terriffic argument about nothing at all the other day, when one of them suddenly yelled in a burst of indignation, "What do you think I am?" Says the other one, as calm as you please, "I don't know, but whatever it is, I'll bet there's only one of it."

And after witnessing a championship wrestling match, **Newt Bass** opines that an army is not the only thing that travels on its stomach.

Now, speaking of the heat wave, **Carol Wagner** declares there can no longer be any question that Los Angeles is the melting pot of the United States.

And a local paper says the "wether is changing", which is a very poor spell of weather to begin with.

Bill Long next expresses the opinion that it must have been a poker player who wrote the scenario for "Goodbye Mr. Chips."

While **Wallace Irwin** remarks that what with cigar lighters, crankcases, compacts, fountain pens, gas tanks and cocktail parties, life these days is just one refill after another.

Speaking of golf, **Dean Stacy** says the driver is the longest club in the bag, and judging by the way some people use it, should be even longer in the bag.

It's ridiculous, however, Dean thinks, for a guy to act like a wild animal every time he gets in a trap.

Doug Barnes now defines a scientist as a man who is always searching for life on Mars, but doesn't go in for much of it here.

Dick Miller keeps in trim for the softball team by batting out copy for Doings in General.

On this subject it is interesting to note that **Dugie Kimmel** is one of the longest hitters in petroleum baseball. He is six feet, four inches long.

And misses the ball with greater force than any man we've ever seen.

Doc Plomert here introduces some rather startling statistics. He states without equivocation that if all the automobiles in Los Angeles were placed end to end with no space whatever between them, it would be 5:30 p.m. on Wilshire Boulevard.

"Boss," says the drilling superintendent, "Do you remember you promised to give me a bonus if we brought in a good well on the Bonedry lease?" "Yeah," replied the boss. "Well," continued the supe, "You ain't gonna have that expense."

Then there was the stenographer who was so homely that the men in the office still kept their eyes on the clock.

Haskel Green now writes to tell us about an unfortunate oil man who went out on a fishing trip and brought home six beautiful trout to his wife, which would have been swell if she hadn't received a bill for eight from the fish market next day.

And when the conductor yelled, "Change here for Marietta," the vacationing rousty remarked, "Well, I don't know who the dame is, but I'll chip in a dime."

All of which brings us perilously close to the end of another distinctly educational session, but we still have time for one more by **Harold Linhoff:** Harold tells about the district accountant who sent a report back to the gauger bearing the simple injunction, "Please write more legibly." Next day the gauger called him up and inquired, "What was that you scrawled across my report yesterday?"

And don't forget that while there has been a lot of criticism of the oil business in the past, the future of the industry is spotless.

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Sure of STRENGTH
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That Will Be Found
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due to the Use
of Only CONCRETE
And BAKELITE
For All Internal
Construction

Vocational Training Acclaimed

By Petroleum Industry's Workers

Recognizing the need for a vocational training program to be conducted in the interests of petroleum workers of California, the Bureau of Trade and Industrial Education, California State Department of Education, last year inaugurated an extensive program to meet this need. Sponsored by the Pacific Coast Division of the American Petroleum Institute, the project met with wide acclaim, not only from the oil workers, but from the entire California petroleum industry. A course of study was designed to provide workers with a broader knowledge of the diverse phases of the industry, as well as to better prepare them to carry on their daily occupations.

In the fall of 1938 classes were organized under the direct supervision of the Bureau of Trade and Industrial Education, in cooperation with the local schools and local Advisory Committees. The Advisory Committees, composed of experienced oil field operators, advise the local school superintendents and co-ordinators as to the organization of classes, selection of qualified teachers, and general program promotion. The California District Subcommittee on Vocational Training of the Topical Committee on Vocational Training, Division of Production, American Petroleum Institute, serves as the State Advisory Committee in the interests of the petroleum industry.

This committee consists of the following: Chairman, Bruce Barkis; Secretary, J. P. Rockfellow, Union Oil Company of California, Los Angeles; W. L. Bagby, Shell Oil Company, Ventura; J. E. Hollingsworth, Long Beach Public Schools; A. C. Moorhead, Standard Oil Company, San Francisco, alternate, A. D. Jackson, Taft, Standard Oil Company of California; H. S. Stark, Honolulu Oil Corporation, Ltd., Taft.

Classes were held in the following oil field communities: Avenal, Bakersfield, Brea, Coalinga, Compton, Long Beach, Los Angeles, Santa Barbara, Santa Maria, Taft, Tracy, and Ventura. An estimated enrollment of nearly 1500 persons attended a total of 42 separate classes.

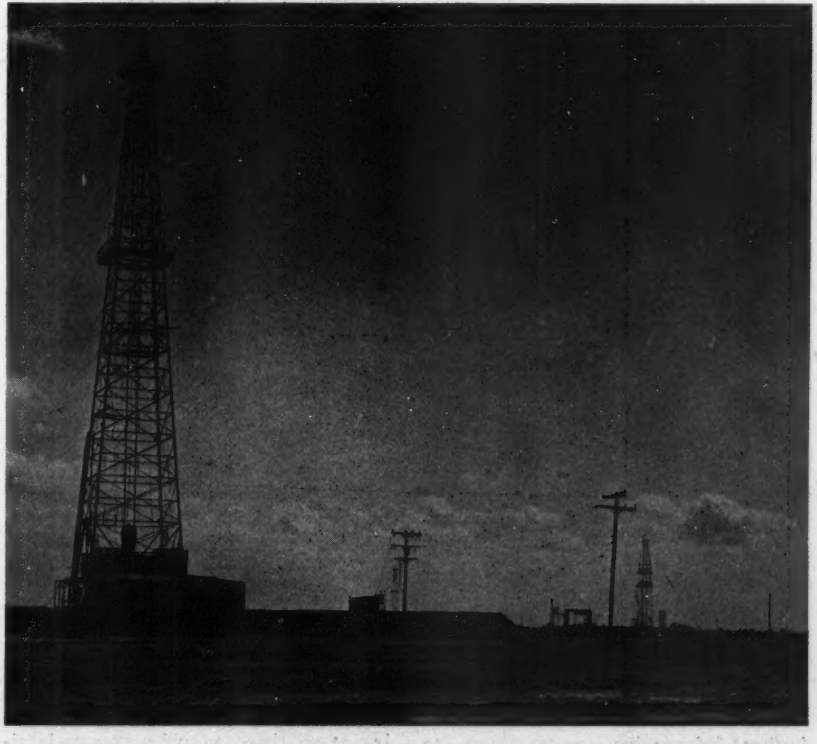
To the teaching staff goes the credit for the successful fulfillment of last year's program. Possessing a background of at least seven years of business experience in their respective teaching field, the instructors were selected from the ranks of the oil industry. A majority of the instructors had previous teaching experience. The following is a partial list of the instructors who have given generously of their time to the educational program: Harry D. Aggers, Vern Austin, Bakersfield; J. D. Robinson, J. A. Bermingham, L. A. Pattison, L. B. Riggins, H. J. Schumacher, Los Angeles; B. Clearwater, K. Bravinder, Dean Sheldon, Fred Hummel, Ned Clark, Paul L. Kartzke, Carl Stickler, F. A. Jones, Frank Knoy, Julius Campbell, Long Beach; Robert Foss, Jan Law, James McNeil, Lewis Kelsey, M. W. Kibre, M. S. Nubank, J. W. Pearson, Compton; Ashley Doss, W. A. Weiss, Vernon Isaacs, W. E. Griffith, Lyman Scheel, Brea; H. B. Beckley, Robert Boykin, Bertes Miller, Santa Barbara; R. P. Mangold, L. B. Sneeden, H. W. Hindry, A. J. Morrison, Wm. Goold, D. L. Deeter, Ventura; F. Dryer, Santa Maria, J. B. Lumbard, J. E. Colbert, Taft; Lee Ralston, Tracy, Coalinga, and Avenal.

Comprehensive in scope, this year's courses are offered under the following general classifications: Drilling Methods and Problems, Productive Methods and Problems, Pipe Line Methods and Problems, Natural Gasoline Plant Operation and Problems, and two basic courses in Oil Field Mathematics and Oil Field Science.

All classes are open to petroleum workers, the only stipulation being that the work chosen should be related to the occupation of the individual. Registration is made by application to the local evening school principal in charge of the trade extension classes. Further information concerning the location of schools offering the courses, together with a more detailed schedule of classes, will be released shortly to the local papers.

J. C. Beswick, chief of the Bureau of Trade and Industrial Education, has appointed Walter Dexter, Jr., coordinator. He will also have charge of instructor training, reporting directly to Dr. David F. Jackey, supervisor of Trade and Industrial Teacher Training, whose headquarters are at the University of California, Los Angeles.

Participation in the vocational training program is entirely voluntary, and it is sincerely hoped that the oil workers' response to the program this year will justify the continuation of the classes. The 1939-40 course of study will be augmented by additional classes if a demand for them is sufficient.



After Getty's success in Janssen No. 1, Wasco Area, and Superior's proof of the super-rig in Burner No. 1, the giant rigs should be in demand. Above is a recent Wasco extension view.

"Sealtite" Weight Indicators Announced by Martin-Decker

Martin-Decker Corporation, Long Beach, California, has announced the development of "Sealtite" Weight Indicators which eliminate the problem of fluid leaks even under the roughest drilling conditions. "Sealtite" Indicators are

permanently sealed at the factory and no further pumping or adjusting is necessary.

The "Sealtite" assembly consists essentially of two parts—the instrument itself and the diaphragm unit—both contained in a special steel box and permanently connected together with special reinforced high-pressure hose and steel fittings. All copper tubing and copper fittings have been completely eliminated in this new hookup. Installation procedure consists of clamping the steel case to a post in the usual manner, removing the diaphragm unit from the case and attaching to the dead line.

The "Sealtite" Weight Indicator gives direct readings in thousands of pounds as well as in points. It is indirectly illuminated for night work, and has an extra-large dial which can be easily read from a distance of forty feet. The entire unit fits into the compact steel box, and can be readily moved from rig to rig whenever desired. It is instantly ready for use at all times without refilling or adjusting.

All Martin-Decker Weight Indicators, including the Quintuplex Drilling Control, are available in the "Sealtite" hookup for positive elimination of fluid leakage under all drilling conditions. For further information, write direct to Martin-Decker Corporation, Long Beach, California.

New Catalogue Issued By Whitney Chain & Mfg. Co.

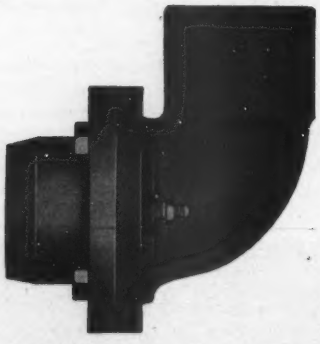
The Whitney Chain & Mfg. Co., Hartford, Conn., have recently published a new Whitney V-135 Silent Chain Drive Catalogue. This book gives complete information for the selection and design of silent chain drive.

Catalogue V-135 includes 64 pages of engineering data, dimensions, horsepower ratings, and sprocket data, as well as illustrations and typical drive in various industries.

A copy of Catalogue V-135 is available by writing to Whitney Chain & Mfg. Co.

H and B Sales Co. All-Steel Rotary Hose

A new all-steel rotary hose designed to meet every requirement for flexibility, strength and service at all depths and under all pressures has been announced by H and B Sales Co., Long Beach, Calif.



Known as the Tri-Plane Champion, this rotary hose incorporates the use of seven high-pressure Champion Swing Joints and Swivels connected together by six lengths of seamless steel tubing and rotating on lubricated roller bearings. The Champion will swivel in any direction from any position in the rig, regardless of pressure, since it has full 360° action in three different planes. It is lighter in weight than similar types, yet it is strong enough to work freely under 5000 pounds pressure without binding, springing or vibrating. It is absolutely fluid-tight, packed off at each joint by composition cups that expand under pressure to form a seal. Thus, the higher the pressure, the tighter this seal becomes, the engineers say.

An outstanding feature of the Tri-Plane Champion Hose is the tapered roller bearing construction of each swivel. These bearings are precision made and fitted to give a smooth even bearing surface. This insures easy turning at all times, provides greater lubricating area and absorbs the pressure thrust over a larger surface, reducing wear. The hose has full opening end to end, and all joints are arranged to provide a straight fluid course. No sand or fluid can reach the bearings, and there are no abrupt shoulders to obstruct fluid passage or cut the hose.

Due to its simple design and construction, the Tri-Plane Champion is easily repaired or repacked after long service. All seven joints can be taken apart, inspected and repacked if necessary in approximately two and one-half hours. No special tools are needed, and the work can be done right at the rig by any member of the crew, saving time and transportation costs. The Tri-Plane Champion is made to meet all requirements for safety, service and economy on all drilling wells at all depths.

Full details can be obtained by writing direct to H and B Sales Company, 2875 Cherry Ave., Long Beach, Calif.

M. E. Tedford, formerly with Lacey Oil Tool Co., and Lewis J. C. Spruance, formerly of Rio Grande Oil Co., are in charge of sales of Tri-Plane Champion Swing Joints and All Steel Rotary Hose for H and B Sales Co.

Tretolite Co. Wins Infringement Case

LOS ANGELES, Sept. 8.—The United States Circuit Court of Appeals for the Ninth Circuit yesterday affirmed the United States District Court for the Southern District of California in the important oil patent case, Tretolite Company v. Research Products Co., Ltd., holding that the latter company, by making and selling a chemical reagent known as "Hydrate 488" for recovering crude petroleum oil from emulsions, had infringed the patent of the Tretolite Company. The case, which has been pending nearly six years, involved a patent obtained by William S. Barnickel, a pharmaceutical chemist of St. Louis. Filed in 1933, the case was originally tried in 1935 before U. S. Commissioner David B. Head, sitting as special master, in Los Angeles. His decision, that the patent was valid and infringed, was sustained by U. S. Judge Harry Hollzer last year.

During the trial of the case it was developed that crude oil valued at more than a billion dollars had been recovered by means of the chemical reagents used in the process of the patent; and that the process was being employed in South America, Mexico, Roumania and other foreign countries, in addition to nearly every oil field in the United States.

The fields of Texas, California and Oaklahoma alone have produced more oil to date than have all the fields of Russia.

Mike Cloran to L. A. for Pittsburgh Equitable

E. M. (Mike) Cloran, formerly in the Engineering Department of the Pittsburgh Equitable Meter Co. and Merco Nordstrom Valve Co. in Pittsburgh, was recently transferred to the company's Los Angeles office. He will handle sales engineering duties, chiefly contacting gas and petroleum departments of Southern California corporations. After graduating from Harvard ('28) he became associated with Stone & Webster and later was with Atmospheric Nitrogen Corporation. He is a member of the sub-committee on Industrial Instruments and Regulators of ASME.

J. H. Slocum Dies In Los Angeles Sept. 10

Joseph Howard Slocum, born Oct. 31, 1872, Kane City, Pa., died Sept. 10. He leaves a widow, Mary, and a brother, T. A. Slocum. Services were in Los Angeles Sept. 12.

One of the pioneer oil men of California, Mr. Slocum's entire life was spent in the oil game. Coming to California in 1887, he immediately went to work for the Union Oil Co. He was one of the first drillers in the old Los Angeles City field in 1895. He finally branched into production for himself. He pioneered in foreign countries for E. L. Doheny and others. He opened several wild cat fields in California and Wyoming. Probably one of the best known of the older oil men of California and one of the last of the old guards.

Rep. Wm. P. Cole Jr. Views Petroleum Exhibit

In San Francisco for a brief stay while on a 6,000 mile motor vacation trip since the adjournment of Congress, Representative William P. Cole, Jr., Maryland (D), visited the Golden Gate International Exposition in company with B. I. Graves, president of Petroleum Exhibitors, Inc.

Sponsor of the federal petroleum conservation bill (H. R. 7372) introduced shortly before Congress adjourned and which remains alive on the calendar for consideration next session, Congressman Cole devoted considerable time during his stay on Treasure Island to an exhaustive inspection of the Petroleum Exhibit.

Congressman Cole indicated that meetings of his sub-committee for consideration of the federal petroleum conservation bill would be held this fall, probably starting in October. The bill is designed to establish federal control of the oil industry under certain conditions, supplementing and coordinating state acts which regulate the production of crude oil.

During his present trip Congressman Cole has visited the Ventura, Long Beach and Kettleman Hills fields in California, as well as having inspected other oil producing areas. He expressed the hope that members of his committee would be able to make a personal inspection of oil sections, including a visit to the Petroleum Exhibit at the Golden Gate International Exposition, before hearings on the federal bill were started.

State Mineralogist Report on Oil Ready

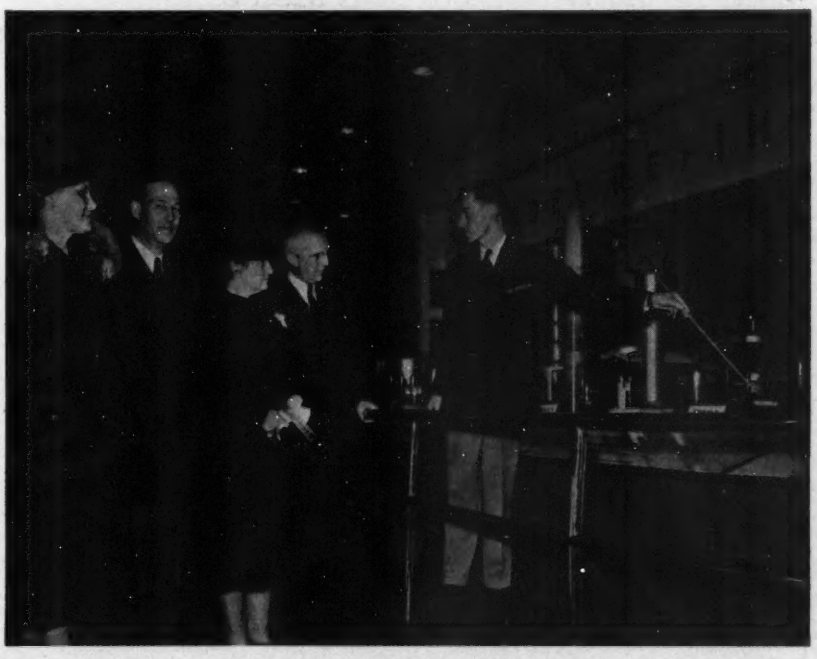
Announcement has been made by Walter W. Bradley, state mineralogist, of the release of the January 1939 issue of "California Journal of Mines and Geology," being chapter 1 of State Mineralogist's Report XXXV.

The geology branch presents a paper on the "Geology and Oil Possibilities of Southwestern San Diego County" by Leo George Hertlein, California Academy of Sciences, and U. S. Grant IV, associate professor of geology, University of California at Los Angeles. Two special articles, "The Prospect for 'Minor Metals' and Non-metallic Minerals" by John Wellington Finch, Director, U .S. Bureau of Mines, and "The Right to Mine" by Robert M. Searls, attorney, San Francisco, and the usual notes on Statistics, Laboratory and Library complete the number. It can be obtained from Division of Mines offices in San Francisco, Sacramento, and Los Angeles for 60 cents, plus 2 cents tax in California.

Ensign Carburetor Announces Changes

Ensign Carburetor Co., Ltd., pioneers in the carburetion equipment industry, announce that Robert R. Wyker, who has been assistant to the president, will, in addition to his other duties, assume the position of sales manager, making his headquarters at the main office in Huntington Park, Calif. Mr. Wyker has been with the Ensign organization for the past five years. He attended Pratt Institute in Brooklyn, N. Y. until 1917 when he entered the U. S. Army, Ordnance Department and attained the rank of second lieutenant. After leaving the service he was associated with the General Electric and affiliated companies and prior to joining the Ensign organization, was engineer for the Union Metal Co. at Los Angeles.

New South American pipe line to be completed in six months will bring oil from the Catatumbo fields in Colombia to a terminal at Covenas on the Atlantic Coast.



During the course of a visit to the Golden Gate International Exposition, Congressman and Mrs. William P. Cole, Jr., of Maryland, in company with Mr. and Mrs. B. I. Graves viewed the Petroleum Exhibit with interest. Pictured at the Model Oil Refinery are Mrs. B. I. Graves, B. I. Graves, President of Petroleum Exhibitors, Inc., Mrs. William P. Cole, Jr., and Representative William P. Cole, Jr., of Maryland.

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Wanted, used 130' steel derrick. Will trade good close-in lease. Box 10, % California Oil World. 9-20b

MAPS

Large maps of Los Angeles Basin oil fields and map showing all California oil fields. Price $15.00 each on paper and $20 each on cloth. Individual state oil and gas maps of Mid-Continent and Rocky Mountain regions. Maps show geological cross sections at base. These maps indicate wells drilling, wells producing and abandoned, with depths.
All maps revised up to date of purchase.
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Los Angeles, Calif.
Phone: TUcker 7530

Oil Men's Calendar

C.N.G.A. Meeting First Thurs. Each Month.

October

4-6—American Institute of Mining & Metallurgical Engineers, Petroleum Division, Galveston, Tex.

9-10—American Gas Assn., Annual Convention, New York.

16-20—National Safety Congress and Exposition, Chalfont-Haddon Hall, Atlantic City.

Week of 16—40th Annual National Automobile Show, Grand Central Palace, New York.

Week of 16—National Tax Conference, Palace Hotel, San Francisco, Calif.

19-20—American Institute of Mining & Metallurgical Engineers, Petroleum Division, Los Angeles, Calif.

November

8-16—National Motor Truck Show, Navy Pier, Chicago, Ill.

13-17—American Petroleum Institute, 20th Annual Meeting, Stevens Hotel, Chicago.

California Crude Oil Production

Two Weeks Ended September 9, 1939

	September Daily Quota	Average Daily Production	Excess
San Joaquin Valley			
Beiridge—North	13,158	12,332	*826
Beiridge—South	20137	1,163	*974
Buena Vista	17,050	14,908	*2,142
Canal	5,797	6,061	264
Coalinga-East (Eocene)	8,280	6,654	*1,626
Coalinga—East-West	16,029	11,956	*4,073
Edison	2,214	2,069	*145
Elk Hills	7,795	10,288	2,493
Fruitvale	6,118	6,675	557
Greeley	2,917	2,636	*281
Kern Front	7,433	6,286	*1,147
Kern River	8,562	3,309	*5,253
Kettleman No. Dome	35,432	52,044	16,612
Lost Hills	4,071	3,398	*673
McKittrick	3,897	3,699	*198
Midway	37,838—	31,626	*6,212
Mount Poso	10,241	10,281	40
Mountain View	9,813	9,779	*34
Rio Bravo	7,590	7,592	2
Round Mt. and Coffee Canyon	8,159	8,774	615
Ten Section	9,045	9,690	645
Wasco	1,385	2,079	694
Other Fields	4,618	4,545	*73
TOTAL	229,579	227,844	*1,735
Coastal Counties			
Elwood	3,913	4,154	241
Rincon	2,372	3,069	697
Santa Maria	8,435	4,157	*4,278
Gato Ridge	2,485	1,754	*731
Santa Maria Valley	19,370	12,442	*6,928
Santa Paula-Newhall	5,883	6,218	335
Ventura Avenue	30,286	34,557	4,271
Other Fields	5,487	5,758	271
TOTAL	78,231	72,109	*6,122
Los Angeles Basin			
Alamitos-Seal Beach	7,037	7,047	10
Brea-Olinda	8,310	5,693	*2,617
Coyote—East	3,098	2,616	*482
Coyote—West	10,267	8,627	*1,640
Domingues	16,309	17,998	1,689
El Segundo	3,025	2,885	*140
Huntington Beach—New and Old	23,208	26,365	3,157
Inglewood	12,366	12,528	162
Long Beach	41,243	46,580	5,337
Montebello	6,976	6,250	274
Montebello-West End	13,529	16,476	2,947
Playa del Rey	4,552	5,051	499
Richfield	7,560	8,166	606
Rosecrans-Athens	8,701	10,454	1,753
Santa Fe Springs	25,191	27,624	2,433
Torrance	5,562	5,166	*397
Torrance "34" and "D & B"	9,209	11,055	1,846
Wilmington	80,691	87,365	6,674
Other Fields	3,407	4,018	611
TOTAL	289,241	311,963	22,722
STATE TOTAL	597,051	611,916	14,865

*—Shortage.